SPARKS COMPANIES INC.

**WORK ORDER NUMBER**

**RMA-03-0002**

# REVIEW OF THE FCIC COST OF PRODUCTION INSURANCE PLAN FOR COTTON

**By Sparks Companies, Inc.**

**September 15, 2003**

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# I. Executive Summary

## *Summary*

1. The proposed Cost of Production (COP) Insurance for cotton is well written and does not have any major flaws that would make it unacceptable for inclusion into the RMA program. Nonetheless, the policy does need to address a few key issues, and these deficiencies are discussed below. What follows is a brief overview of the key findings of Sparks' team review and recommendations.

## *Strengths*

1. The cost of production insurance is less expensive than revenue insurance.

2. The instructions to crop insurance agents are written in a clear and precise manner. The contract should be relatively easily understood by the insurance agents.

3. The flexibility of the contract coverage to grow as expenses increase addresses a major problem in agricultural production. Since agricultural production is dependent on the forces of nature, the costs of production will vary depending on the weather, insects and diseases. The dynamic concept of insuring a full range of changing costs should be quite attractive to farmers.

4. The payment system appears to be transparent and measurable. In short, the insured must produce receipts for the expenses in order to be compensated.

5. Cost control measures put a cap on claims that can be paid, since claims can never exceed a producer's expected revenue. This makes the program less likely to be used as a revenue generator by farmers.

## *Weaknesses*

1. Ginning costs should not be included in the insurance because ginning is a post-harvest agricultural processing and value-adding activity. Likewise, cottonseed should not be included in the revenue. Excluding ginning costs from the insurance has four advantages. First, the insurance is intended to only cover farming expenses. Second, excluding ginning costs would lower the expenses of harvest and in return, lower the cost of the insurance. Third, monitoring the transactions between the farmer and the ginning operation could prove to be challenging, as larger farmers own their own gins and smaller farmers often have other financial relationships with the ginning operation. Fourth, a clearly defined end point is established as to when the insurance stops. This means the insurance will not cover storage costs or include equity payments.

2. Farmers who are new or who have changed cropping practices have a higher level of uncertainty surrounding their expected expenses and expected revenues. As a result, they are forced to pay an additional premium to account for the uncertainty surrounding their farming operation. Perhaps the insurer should consider inserting a clause into the policy that states that if the farmer uses the insurance for five years and his farming operation does not have a higher risk than the other farms in the county, then for the next five years, he will receive a discount on his premiums equal to the additional premiums he was forced to pay.

3. Since farming operations have very high costs relative to revenues, or a low profit margin, the farmer usually will be able to maximize the amount of an indemnity he can receive. When fixed costs are included, the farmer's total cost will be near the farmer's expected gross revenue. This in turn makes the contract very similar to a revenue policy and limits the usefulness of the flexibility the contract offers with respect to increasing variable costs.

4. The policy requirement of verifiable records for all expenses and revenues will create a large amount of paperwork for both the farmer and the insurer. In addition, a producer might be concerned about putting his cost information in front of everybody who works at the local insurance office.

5. A producer should not be able to participate in the "pilot program" if he has production outside of the pilot counties. Only a limited number of producers should have the opportunity to participate due to the program's pilot nature. Moreover participants should be limited to a select number of counties, and a further pilot program constraint should be considered in order to eliminate this related moral hazard.

### *The Principal Review Finding*

1. Based on the project team's evaluation and analytical review of the material, Sparks recommends that the proposal is suitable for adoption by the United States Department of Agriculture, Risk Management Agency, with amendments for the five weaknesses described above.

## II. Introduction

Sparks' review of the Cost of Production (COP) Insurance for Cotton is presented in the following framework. The next section “Review of Methodologies” elaborates on the methodologies that were used during the review process. Section IV, “Issues Surfaced,” presents Sparks’ perspective regarding the questions outlined in the “Procedure for the Submission and Review of New and Revised Crop Insurance Policies”. Section V highlights Sparks’ recommendation to the Risk Management Agency concerning the proposed Cost of Production Insurance for Cotton. Additionally, an Appendix in the report adds supportive detail to our conclusions and recommendations. The Appendix is an evaluation of special topics of concern for the policy.

## III. Review of Methodology

The review team is comprised of individuals with different areas of expertise. A biography for each member is included in Section VII. Members of the team reviewed the policy from their particular position of expertise. For example, the crop analysts reviewed the procedures related to determining crop yields. Each member then developed special topics that described their concerns. After the special topics were written, the group answered the questions in Section IV. “Issues Surfaced” and formed an opinion as to whether or not the insurance should be approved.

# IV. Issues Surfaced

## 1. Protection of producers' interests.

### A. Does the policy provide meaningful coverage that is of use to producers, and provide it in a cost-efficient manner?

Cotton farmers likely will be intrigued by the Cost of Production (COP) insurance policy due to the current gap between the Actual Production History (APH) yield based insurance and Crop Revenue Coverage (CRC) revenue based insurance policies. Since cotton farmers have very high costs relative to returns on investment or equity, the farmer will usually be able to maximize the amount of an indemnity he can receive. Appendix Topic 2 – Cost Structure illustrates that a large number of farmers base their planting decisions on expected returns above variable costs. When fixed costs are included, the farmer's total cost will be near the farmer's expected gross revenue. This, in turn, makes the contract very similar to a revenue policy.

The policy does provide the farmer with the flexibility to recover additional costs that occur when the farmer has an insect invasion, but this is limited due to the provisions outlined in the policy. Specifically, the policy provisions indicate that coverage cannot exceed total expected gross revenues and the increased expenses cannot exceed 25% over the total variable costs. In addition, it is anticipated that the farmer will be in a quandary when trying to decide whether to expend over the amount required to preserve the crop. If he abandons insect control, he runs the risk of contract default.

In addition, the policy provides the farmer with another insurance option. The farmer's decision to buy the COP insurance or CRC insurance will depend on whether the COP insurance premiums are low enough relative to CRC insurance to offset the additional operational cost the farmer incurs in preparing the extra paper work required to be able to document all his expenses and revenues.

### B. Is the policy clearly written such that producers will be able to understand the coverage that they are being offered? Does the policy language permit actuaries to form a clear understanding of the payment contingencies for which they will set rates? Is it likely that an excessive number of disputes or legal actions will arise from misunderstandings over policy language?

Yes, the policy is written in a clear and precise manner. The basic provisions clearly state the coverage that is being offered to producers. Although it is difficult to anticipate the underlying reasons or motivations of potential litigants, it is deemed that the policy is written in a relatively clear and forthright manner which should minimize the prospects of litigation. Overall, it is unlikely lawsuits will result from policy misunderstandings.

**C. Is the mechanism for determining liability (i.e., the amount of coverage) clearly stated and supported by an example?**

Yes, the basic provisions clearly state the mechanism for determining the amount of coverage and they are supported by examples.

**D. Is the mechanism for determining the amount of premium clearly stated and supported by an example?**

Yes, the basic provisions clearly state the mechanism for determining the amount of premium, and this mechanism is supported by an example.

**E. Are the mechanisms for calculating indemnities clearly stated and supported by an example?**

Yes, examples are included for different farming scenarios that a farmer enrolled in COP might experience.

**F. In the case of price or revenue policies, are the mechanisms for establishing price clearly stated?**

Yes, the basic provisions specifically outline the mechanism for determining the price under the COP insurance policy. Prices associated with the FCIC established price, FSA loan rate and actual marketing receipts for sold production are clearly designated and stated within the basic provisions.

**G. Is adequate, credible, and reliable data available for establishing expected market prices for insured commodities? Is it likely that the data will continue to be available? Is the data vulnerable to tampering if the proposed policy is approved? Is the data likely to be available when needed? Is the proposed system for publishing prices feasible?**

Yes, the data will come from the farmer's own verifiable records. In addition, for determining the revenue cap, lint cotton prices are widely quoted.

**H. Does the policy avoid providing coverage in excess of the expected value of the insured crop?**

Yes, the policy limits the size of the insurance coverage to the expected gross revenue. This effectively limits the coverage to the expected value of production.

**I. Does the policy contain indemnity or other provisions that cannot be objectively verified by loss adjusters, underwriters, or auditors?**

No, but evaluating crop loss by RMA's standard methods could lead to inconsistencies between adjusters in different regions of the country. For example, for cotton planted on 16-inch rows or greater, the instructions call for 1/100 of an acre to be sampled. However, in the case of ultra narrow row cotton (UNRC), the

sample required is 1 square yard. To equal 1/100 of an acre of UNRC the sample size should be 50 square yards. It appears that either the 1/100 is too large a sample area or the 1 square yard is too small. The variability in yields is greater in narrow-row fields than in conventionally planted fields. In addition, the instructions state that bolls should be classified as small, medium and large. Subjectivity by the adjuster could be removed by adding specific size rings to objectively determine boll sizes. The claims adjuster will have to make a judgement call that could be avoided with clearer instructions. This is not a problem with COP insurance, but with RMA's standard method of determining crop loss for all crop insurance.

**J. Is the policy likely to treat all similarly-situated producers the same?**

Yes, similarly-situated producers should be treated the same, assuming the loss adjusters are consistent across different regions of the country as described above in the answer to question I.

**K. Will insurers be able to comply with all requirements of the policy?**

Yes, insurers will be able to comply with the policy requirements. However, the policy requires a large amount of paper work when applying for the COP insurance and both the insured and the insurer must maintain and document all costs associated with the farm operation. After the first year, when re-applying for the insurance, the farmer may rely on the prior year's numbers as a point of comparison.

**L. Does the policy create vulnerabilities to waste, fraud or abuse?**

Yes, the COP insurance is vulnerable to abuse. The primary concern would be the farmer overstating his fixed cost; nonetheless, given that higher production costs equal higher insurance rates, the insurance policy does give the farmer some incentive not to abuse the system. In addition, many farmers own their own gins. There is no way the insurer could prevent the insurance from being abused by farmers who own their own gins. For example, if a group of farmers own their own gin, COP insurance could be used to insure the profitability of the gin by each farmer claiming an above average ginning cost on his application. The higher production cost does raise the premium the farmer must pay, but if a crop failure does occur, the revenue from the ginning operation will be covered.

**M. Is the product likely to adversely affect the agricultural economy of the crop that is proposed for coverage, or of other crops or areas?**

Yes, the policy could give upland cotton an advantage over the other crops grown in a region. Other crops are expected to be added to the list for which Cost of Production Insurance will be made available; however, in some cases this program is not planned to cover the other main crops in an area. In West Texas, for example, the main alternative crop to dryland cotton would be sorghum, which is not included on the list. In California, Pima cotton is exhibiting an increasing trend in

plantings, while the COP insurance program is specific to upland cotton. This imbalance among crops may generate unintended cropping consequences.

The availability of COP insurance would seem to be a positive for production (i.e., a stimulus all other factors held constant). That being the case, if the insurance is subsidized with US government funds, commodities covered by COP insurance are being subsidized relative to other commodities not having like insurance coverage. If this line of reasoning is correct, the RMA may need to be cautious as it rolls out COP in some regions to avoid unwanted crop mix influences.

## 2. Actuarial soundness.

**A. Is adequate, credible, and reliable rate-making data available? Is the data vulnerable to tampering if the proposed policy is approved?**

Yes, data needed for the rate making is provided by the USDA and the farmer's verifiable records.

**B. Are the explicit and implicit assumptions used in the rating process reasonable?**

Yes, the assumptions utilized by Agri-Logic are sound. Nonetheless, the implied total cost for cotton appears to be too low (See Appendix Topic 2 – Cost Structure). If the farmer's total costs are low, then the rates will be too low.

**C. Are the technical analyses (e.g., stochastic and other simulations) technically correct? Do they provide credible, relevant results?**

Yes, the models are technically correct, but it does appear the model underestimates the implied total costs (see Appendix Topic 2 - Cost Structure). The model does compare the farmer's actual yield variability to the county yield variability and adjusts the premiums paid accordingly. Some of the rate making analysis is beyond the scope of our expertise.

**D. Is the data used for the analyses appropriate, reliable, and the best available?**

Yes, the source for the data is the USDA.

**E. Does the actuary certifying the submission's rates provide adequate and accurate support for the certification?**

Maybe. It cannot be determined if the process used to blend the NASS and RMA data is statistically correct.

**F. Does experience from prior years and relevant crops and areas support the validity of the proposed rates?**

Yes, provided that the rate of change of cotton production crop practices do not shift dramatically. Currently, the trend towards ultra narrow row cotton will decrease the accuracy of using past years to predict future results. Also, adoption of GM cotton in 2000 was sixty-one percent but grew to seventy-three percent in 2003 according to USDA. That being said, it is suggested that analog past experiences are a logical method for projecting the future.

**G. Is the product likely to be sold in a sufficient number such that actuarial projections would be credible?**

Maybe. The number of policies sold will depend on whether COP insurance is priced low enough relative to CRC insurance to encourage the farmer to document his farming expenses and on whether the farmer does not believe he can make money on the CRC insurance. In addition, a producer might be concerned about putting his cost information in front of everybody who works at the local insurance office. CRC insurance serves a similar function by providing coverage for loss of revenue. The difference is that the CRC insurance is based on the New York futures market and the COP insurance policy is based on the farmer's total cost. Therefore, the COP insurance will lose its attraction relative to CRC insurance in high priced years due to the mechanics of the CRC policy. Lower priced years, like those expected over the duration of the current farm program, might make COP a viable policy with its lower premium schedule.

**H. Does the submission increase or shift risk to another FCIC-reinsured policy?**

No, but COP insurance will compete with other types of insurance. Since cotton farmers have very high costs relative to returns on investment or equity, the farmer will usually be able to maximize the amount of an indemnity he can receive. Appendix Topic 2 – Cost Structure illustrates that a large number of farmers base their planting decisions on expected returns above variable costs. When fixed costs are included, the farmer's total cost will be near the farmer's expected gross revenue. This, in turn, makes the contract very similar to a revenue policy. The farmer's decision to buy the COP insurance or CRC insurance will depend on whether the COP insurance premiums are low enough relative to CRC insurance to offset the additional operational cost the farmer incurs in preparing the extra paper work required to be able to document all his expenses and revenues. Dropping the ginning cost will further reduce COP insurance premiums relative to CRC insurance premiums.

**I. Does the submission create potential excessive adverse selection, either by itself or in the presence of any other risk management product, whether reinsured by FCIC or not?**

No, but "slippage" will result from fixed costs being larger than expected. The farmer loan data understates his true costs because the farmer wants to increase his chance of obtaining the loan by showing a higher profit margin. In addition, the farmer must pay interest on the money that he borrows. For COP insurance, the

farmer can increase the indemnity payment by overstating his costs. The difference between the two will result in "slippage".

**J. Are the proposed premium rates likely to cover anticipated losses and a reasonable reserve?**

Maybe, because the size of the indemnities are capped to gross revenue.

## 3. Other review areas.

**A. Does this policy provide coverage that, in whole or in part, is generally available from the private sector?**

No, the COP insurance is not available from the private sector to the best of our knowledge. However, other policies exist (primarily the CRC insurance), that serve a similar function by providing coverage for loss of revenue. The difference is that the CRC insurance is based on the New York futures market and the COP insurance is based on total costs. Once the COP insurance reaches the gross revenue cap, the COP insurance and CRC insurance become substitutes for each other.

It should be noted that CRC insurance is based on an objective market standard and the COP insurance is based on an individual's accounting records. Obviously, the farmer has a vested interest in the process. Which insurance the farmer chooses will depend on the price of cotton and the cost of the premiums.

**B. Does the policy propose to insure a peril that is not authorized by the Act?**

Maybe. The policy insures the ginning of cotton, which is an agricultural processing and value-adding operation. We do not know if the Act allows for insuring agricultural processing and value-adding operations.

**C. Does the policy place an unreasonable administrative burden on the insurers, AIPs, or the Federal crop insurance program?**

Maybe. The amount of paperwork that will be generated will be more burdensome when compared to other types of insurance. Smaller farmers and insurers might not be able to employ enough labor to comply with the policy's requirements. Prepackaged RMA computer forms would facilitate the process and reduce the administrative burden on the insurer.

**D. To the extent of the reviewer's knowledge, does the policy comply with all requirements of the Act and the public policy goals of the Corporation?**

Yes, with the exception that the policy covers an agricultural processing and value-adding operation (i.e., ginning).

## 4. Review issues specific to the FCIC Cost of Production Cotton plan of insurance.

**A. Would it be likely that this product would affect crop selection decisions?**

Yes, the policy could give upland cotton an advantage over the other crops grown in a region. The availability of COP insurance should be a positive for production (i.e. a planting stimulus all other factors held constant). Since the insurance is subsidized, commodities covered by COP insurance will have an economic advantage relative to other commodities not having like insurance coverage. How much crop rotations will be affected will depend ultimately on the adoption rate of COP insurance.

**B. Would it be likely that this product would affect the Extension crop budget preparation process?**

No, crop enterprise budgets are meant to be a guide for the farmer and do not include insurance and government programs. The farmer should tailor the budgets to his specific farming operations.

**C. Are existing Extension crop budgets reliable and accurate for insurance purposes?**

Yes, the variable cost portion of the enterprise budgets is very accurate for a normal year. The policy could cover an abnormal year when there was an insect invasion or drought. The fixed cost portion of the enterprise budget is accurate, but it is based on real agricultural needs rather than tax considerations. The tax considerations in accounting lead to fixed costs being overstated or understated on an agricultural basis.

## 5. Supplemental Review Questions from Board Members

**1) Changes in itemized variable expenses more than 20% must be reported. During any given year, these expenses can vary greatly depending upon climatic conditions and unexpected major mechanical problems. This is a severe handicap to make adjustments to the insurance policy with the agent who may be hundreds of miles away during a high stress time of the growing season. Failure to report in time may result in loss of insurance, which probably will be discovered only at claim times. Remember that this is the outline for future COPs for other crops. Cotton is a very low growing expense crop with limited expense items compared with many specialty crops. In specialty crops these numerous expenses can change very rapidly depending on the unique or unusual growing conditions in any one year. One wonders which agents and companies are going to be able to keep track of all this extra paperwork and whether or not problems will arise during claim times.**

With cotton, the farmer's willingness to deal with the administrative costs will depend on the COP insurance premiums relative to CRC insurance premiums. The larger and better managed farms will easily be able to meet the requirements, because they already employ staff which handles administrative activities. A small farmer who does his own accounting might not have the resources needed to meet the requirements of the policy.

We do not know if offering the insurance will generate enough revenue for the insurer to offset the administrative costs. Smaller insurers might not have the resources necessary to meet the requirements of the policy. A real-time RMA internet compatible computer program with standard computer forms would relieve some of the administrative burden to insurers, as well as limiting moral hazards.

**2. Pay close attention to the APH x price ceiling cap. All farmers who have had a disaster year (or years) are heavily penalized with amount of coverage + higher premium rates. Will this cause economic micro shifts in production due to availability for operating loans when loans may be evaluated on coverage amounts? Remember that one bank controls the majority of operating loan funds.**

No, the farmer will shift production if he can't grow cotton at sufficient profitability, not because he cannot receive insurance. The insurance should not result in the farmer growing cotton when it is not economical.

3. **Does this insurance offer any more coverage than other plans already available? Previous studies show rare instances for this model to do as much. Usually recovery is less. Less insurance cost does not mean better coverage.**

   No, since the profit margin on agricultural farming operations is very low, the COP insurance and total revenue insurance should be nearly the same in many years.

4. **Due to data needed for the policy to determine a standard expense ceiling, the policy may be severely limited to few areas that will have adequate 3rd party (excluding banks with conflict of interest) information.**

   Yes, and bank records could understate the farmer's true expenses. In order to get a loan, a farmer must demonstrate an ability to repay the loan or have a profit. Understating expenses, especially fixed expenses, will create a larger profit margin. In addition, paying interest gives the farmer an incentive to borrow only the money he needs to produce a crop. By comparison, the COP insurance encourages the farmer to have his expected expenses equal his expected revenue, although lower expenses are rewarded with a lower premium.

5. **The past 15 year history has shown sale price decline and inputs quickly increasing with overall production steady or rising ever so little. In the future will this insurance become less attractive than currently?**

   Maybe. The actual price the farmer receives is the price of the cotton plus government subsidies; so, sale price decline is not an issue. The policy premiums get more expensive as the farmer's production costs rise; so, higher premiums could cause farmers to shift to another type of crop insurance.

6. **This cotton policy has failed earlier due to inadequate coverage. This version only begins to fulfill by inserting subsidies into price. As a model for future crops what happens with crops with no supports? Are we putting ourselves into favoritism or worse? Why not build a data bank on cost by region for crops and build the insurance around it? As it stands now are we defeating the purpose why the term Cost of Production is even stated because revenue is the governing factor.**

   As directed by RMA, only questions about cotton are addressed in this document.

7. **Is the cost worksheet misleading when it lists harvest costs which can be made up primarily of fixed equipment costs? Is this term meant to reference only custom harvest charges?**

   No, it is meant to include all harvest costs. Ginning cost is included even though it is a post-harvest agricultural processing and value-adding activity.

8. **Variable costs are supposed to be capped at 125% of county average. This is not explicitly included in the policy provisions, but rather is calculated and**

**placed in the actuarial documents. Does it appear that producers will understand this "implicit" cap?**

Yes, but in case they do not realize the "implicit" cap, this should be included on the "Disclaimer Form".

## 6. Supplemental Review Questions from RMA

**Background for Questions 1-3:**

**The proposed COP plan reduces indemnities to the extent that production expenses are not incurred. This is substantially similar to a feature called "stages," which is found in some crop insurance plans.**

1. **Could the proposed COP incorporate stages that were not based on production-expense data?**

   No, COP insurance needs to be linked to a producer's production costs. If it is not linked to a producer's production costs, the COP insurance would in effect become a hybrid of two insurance policies and require even more paperwork and instruction.

2. **How would this affect the insurance plan in terms of ease of administration?**

   Stages should have very little effect on the insurance, since the insurer and farmer are both required by the policy to maintain a written record of expenses and revenues.

3. **Are producers likely to react positively or negatively to the presence of stages in the proposed COP plan?**

   If the farmers are not familiar with the policy, they might interpret stages as more paperwork.

4. **Would the premium rates produced by the individualized rating system for COP versus the APH-based rating system for other plans have any negative effect on the actuarial performance of the other plans or FCIC in general?**

   Maybe. We cannot determine what the affect COP insurance rating system would have on the APH insurance rating system.

5. **Are the individualized rates produced by the proposed COP rating model credible?**

   The rates proposed by the COP rating model appear reasonable; commenting on the blending of NASS and RMA data is beyond our scope of our expertise.

**6. Production-expense data is used in the proposed COP plan for the following purposes:**

**a) Insurance Guarantee – Limit the maximum amount of insurance available when reported production expenses are less than the expected gross income (EGI).**

**b) Insurance Indemnity – Reduce loss payments when actual production expenses are less than the Approved Expenses.**

**Does the incorporation of production-expense data serve any other function or provide any other benefit in the proposed COP plan?**

No, we do not know of any other benefits.

**7. When its pilot programs contain unusual or controversial features, FCIC sometimes requires that applicants sign a "disclaimer" at the time of purchase. These disclaimers contain a statement whereby the producer acknowledges that the unusual/controversial features exist and that she/he understands and accepts them. Such forms are used to promote a thorough discussion between the agent and the producer before the sale is completed, thereby reducing the probability of angry feelings at loss time. A draft disclaimer for COP, which highlights four features, is included at the end of this Appendix. Should FCIC require COP applicants to sign this or a similar disclaimer? If so, are there other components that should be included in the Disclaimer?**

Yes, and the "implicit" cap on variable costs being 125% of the county average should be included. If the insurer is required to disclose the "implicit" cap, the farmer will want to know what is the county variable cost. This might lead to the problem of a farmer using the county variable costs as a "target" for their own stated variable expenses.

**Background for Questions 8-9:**

**The entire rating model is based on a set of data that was generated by combining various NASS and RMA data sets and statistics. The goal of the generation process was to create a set of producer level time series yield data. Part of the generation procedure involves using NASS 1997 Census of Agriculture Data. The NASS data were reported by county. Within that county NASS grouped the producer yields into five segments. The lowest 20% of yields are quintile one and so on until the highest 20% of yields are quintile five. Each quintile has a set of statistics including number of producers (by definition the same amount in each segment) yield mean and yield standard deviation. In order to generate a data set for 1997, the contractor assumes a normal distribution within each quintile. Then using the normal distribution (for each quintile) and its respective statistics a set of producer yields is generated.**

**8. Can this assumption of normality within a quintile in the NASS yield data be safely made?**

Maybe. In the Western U.S., it is not uncommon for 5 percent of the farmers to control 80 percent of the production. In addition, some of the counties in the pilot program have a small number of farmers. The chances are great that a large number of the quintiles are skewed toward the farm being larger than it is in reality. This could be a problem if the large farmers have a significantly higher yield than the smaller farmers. Another problem with using 1997 NASS data is the Mid-south cotton acreage was the second lowest since 1990.

**9. Is there a more appropriate assumption that could be made to generate the set of producer data?**

The data could be made larger by using a crop district or more complete by conducting a survey.

**Background for Questions 10-13:**

**After the data set for 1997 is generated from the quintiles, the yields are plotted relative to the county average. These 1997 yields are then plotted across time keeping the same relationship with the county average as was demonstrated in 1997. A random adjustment is then made to represent variability across years.**

**10. Is this adjustment reasonable?**

Yes, but in the areas where crop problems are common, they will have a better set of data than areas where crop problems are less common. Is the length of time great enough to accurately capture crop problems that occur in California? Also, in the Mid-South, 1997 cotton yields averaged the second highest since 1990.

**11. Is this adjustment constrained by the spatial variability that existed in 1997?**

Yes, the quintiles should minimize that problem but will not eliminate the spatial variability. An uncommon event, such as a rain storm that only occurs on half the county, could greatly affect relative cotton yields among farmers. Usually, a three year average of production is needed to minimize the effects of uncommon events.

**12. This data set is the basis for all rate calculations. Do these data simulation and adjustment procedures generate a set of good data for the purposes of rating?**

It is beyond the scope of our expertise.

**13. Is there a better data set that could be used for the rating of this product?**

No, not any better than the USDA.

**Background for Question 14:**

**The producer's premium rate is the weighted average of three functions,**

**Rate = a*f($PM_{County}$, $PM_{Producer}$) + b*g($Y_{County}$, $Y_{Producer}$) + c*h($CV_{County}$, $CV_{Producer}$),**

**where PM = profit margin, Y = average yield, CV = coefficient of variance, and a + b + c = 1. Each function compares the producer's variable to the county average and calculates a premium. For example if a producer's average yield ($Y_{Producer}$) is greater (lower) than the county average yield ($Y_{County}$), then the function producers a yield premium rate that is lower (higher) than the county base yield premium rate.**

**The premium rate formula is the weighted sum of the three functions so that each function (and the variable it uses) is treated as being independent of the other functions. However, there would seem to be interaction between the functions.**

**For example, it seems that a producers' average yield should influence the degree to which his or her CV affects the probability of an indemnity.**

**This point is illustrated in Graphs 1 and 2. Graph 1 shows the crop yield probability distributions for two producers. They both have the same average yield but different variances. The yield at which the producers indemnify is I. The area labeled A shows the increase in the probability of an indemnity for the producer with the greater value variance.**

**Graph 2 shows the same situation except that the two producers have a higher mean. In this case the difference in the probability of an indemnity (area A) for the two producers is much smaller.**

**This illustrates that a higher mean reduces the effect of variance on the probability of an indemnity. However, the rate formula shown above does not allow for this. The effect of the coefficient of variance on the premium rate is the same no matter what the average yield is.**

**14. Is it appropriate to calculate the premium as the weighted average of three independent functions of profit margin, average yield, and coefficient of variance of yield In other words, are these functions actually independent?**

No, the profit margin depends on the per acre yield, per bale price, and total expenses per acre. Therefore, profit margin is dependent on the yield.

# V. Recommendations

Based on the project team's evaluation and analytical review of the material, Sparks recommends that the proposal is suitable for adoption by the United States Department of Agriculture, Risk Management Agency with amendments as described below to enhance the policy's strength.

1. Ginning costs should not be included in the insurance because it is a post-harvest agriculture processing and value-adding activity. Likewise, cottonseed value should not be included in the revenue. Excluding ginning costs from the insurance has four advantages. First, the insurance is intended to only cover farming expenses. Second, excluding ginning costs would lower the expenses of harvest and in return, lower the cost of the insurance. Third, monitoring the transactions between the farmer and the ginning operation could prove to be challenging since larger farmers own their own gins and smaller farmers often have other financial relationships with the ginning operation. Fourth, a clearly defined endpoint is established as to when the insurance stops. This means the insurance will not cover storage costs or include equity payments.

2. Farmers who are new or who have changed cropping practices have a higher level of uncertainty surrounding their expected expenses and expected revenues. As a result, they are forced to pay an additional premium to account for the uncertainty surrounding their farming operation. Perhaps the insurer should consider inserting a clause into the policy that if the farmer uses the insurance for five years and his farming operation does not have a higher risk than the other farms in the county, then for the next five years, he will receive a discounted premium equal to the additional premiums he was forced to pay.

3. A producer should not be able to participate in the "pilot program" if he has production outside of pilot counties. Only a limited number of producers should have the opportunity to participate due to the program's pilot nature. Moreover participation should be limited to a select number of counties, and a further pilot program constraint should be considered in order to eliminate this related moral hazard (See Appendix Topic 4 – Unit Structure).

# VI. Appendix: Special Topics (Graphics and Tables)

The special topics are areas researched by different members of the team depending on their area of expertise. This approach allowed the members the freedom to explore the topics in greater detail.

### *Topic 1 – COP Insurance Versus Other Types of Crop Insurance*

1. The APH insurance is inexpensive, but sometimes does not provide adequate coverage, and CRC insurance is considered to be expensive. Farmers will be attracted to the COP insurance policy only if it is cost effective relative to revenue based insurance products. APH insurance requires a lower premium relative to revenue based insurance products, but only provides protection against yield losses. The CRC insurance is very expensive; therefore, making it attractive only when prices are relatively high early in the crop year (January) and are expected to decline dramatically in the fall (November).

2. Since cotton farmers have very high costs relative to returns on investment or equity, the farmer will usually be able to maximize the amount of an indemnity he can receive. Appendix A Topic 2 – Cost Structure illustrates that a large number of farmers base their planting decisions on expected returns above variable costs. When fixed costs are included, the farmer's total cost will near the farmer's expected gross revenue; this in turn makes the contract very similar to CRC insurance.

3. COP insurance does provide the farmer with the flexibility to recover additional costs that occur when the farmer has an insect invasion, but this is limited due to the provisions outlined in the policy. Specifically, the policy provisions indicate that coverage cannot exceed total expected gross revenues and the increased expenses cannot exceed 25 percent over the total variable costs. In addition, the farmer will be in a quandary trying to decide whether to spend over the amount required to preserve the crop. If he abandons insect control, he runs the risk of contract default.

4. COP insurance is at a disadvantage to other insurance in terms of related operational costs because the farmer has to prepare extra paper work in order to be able to document all his expenses and revenues.

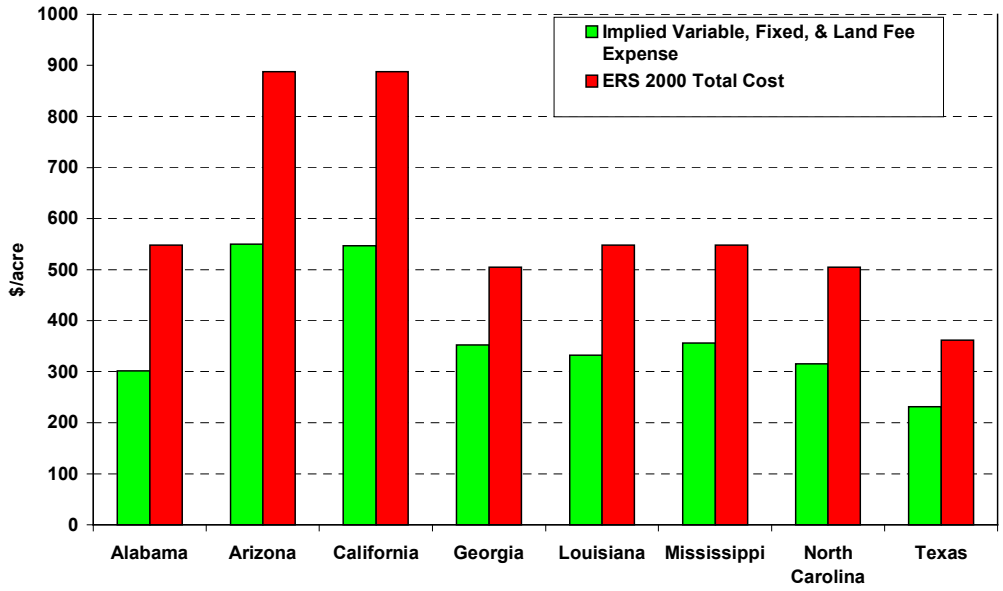
### *Topic 2 - Cost Structure*

1. The implied total cost of production used in setting insurance premiums appears to be understated, if it indeed uses variable costs, plus fixed costs, plus land use expenses. Implied producer costs are shown as liability divided by acreage in *Excerpt 1. Estimated potential Cotton acreage, liability, and premium that could be written under the Cost of Production Insurance program* found on page 1 of the risk assessment section (See Excerpt 1). A comparison with ERS total expenses reveals the degree of understating that may exist (See Figure 1 – Implied Producer Costs).

## Excerpt 1 - Estimated Potential Cotton Acreage, Liability, and Premium Under the Cost of Production Insurance Program

| | Acreage (acres) | Liability ($) | Premium ($) | Implied Variable, Fixed, & Land Fee Expense ($/acre) |
|---|---|---|---|---|
| **Alabama** | 208,500 | 62,900,000 | 5,620,000 | 302 |
| **Arizona** | 197,000 | 108,300,000 | 5,980,000 | 550 |
| **California** | 572,400 | 313,200,000 | 17,280,000 | 547 |
| **Georgia** | 162,700 | 57,400,000 | 3,170,000 | 353 |
| **Louisiana** | 312,000 | 103,600,000 | 6,350,000 | 332 |
| **Mississippi** | 404,800 | 144,300,000 | 7,330,000 | 356 |
| **North Carolina** | 171,400 | 54,100,000 | 2,990,000 | 316 |
| **Texas** | 2,471,500 | 573,100,000 | 50,510,000 | 232 |
| **Total** | **4,500,300** | **1,416,900,000** | **99,230,000** | **315** |

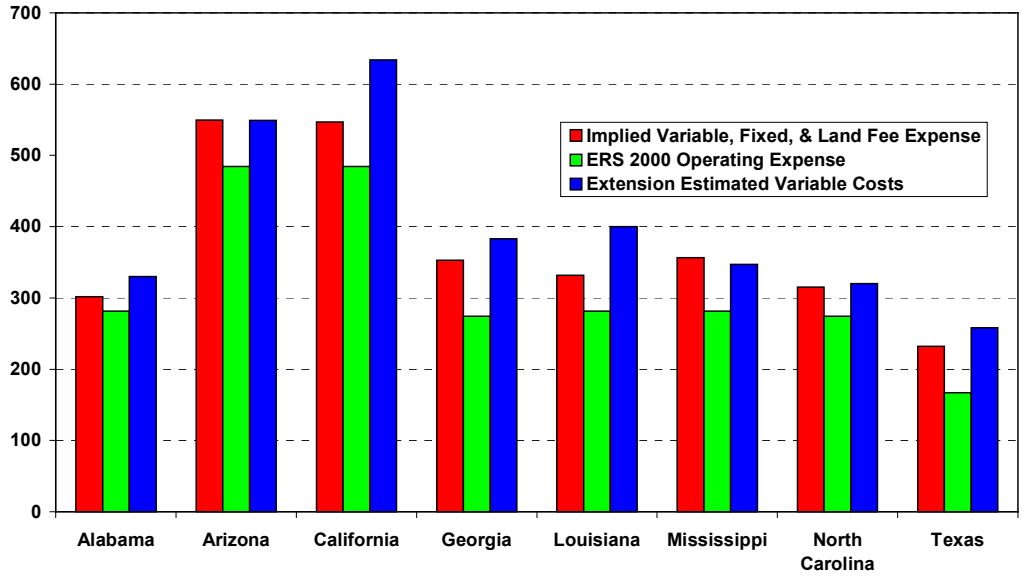
## Figure 1 – Implied Producer Costs




Source for Figure 1: USDA and Risk Assessment

2. Figure 2 – Implied Costs Versus Other Sources Variable Costs illustrates the implied costs appear more in line with variable cost components obtained from ERS and individual state Extension agencies.

**Figure 2 – Implied Costs Versus Other Sources Variable Costs**




Sources for Figure 2: USDA, State Extension, and Risk Assessment

***Topic 3 - Altering the Cropping Practices***

1. Other crops are expected to be added to the list for which Cost of Production Insurance will be made available; however, in some cases this program is not planned to cover the other main crops in an area. In West Texas for example, the main alternative crop to dryland cotton would be sorghum, which is not included on the list. In California, Pima cotton is exhibiting an increasing trend in plantings and this program is specific to upland cotton. This imbalance among crops may generate unintended cropping consequences.

2. The availability of COP insurance would seem to be a positive for production (i.e. a planting stimulus with all other factors held constant). That being the case, if the insurance is subsidized with US government funds, commodities covered by COP insurance are being subsidized relative to other commodities not having insurance. If this line of reasoning is correct, the RMA may need to be cautious as it rolls out COP in some regions to avoid unwanted crop mix influence.

3. The farmer plants Bt cotton based on the probability of financial loss from not planting *Bt* cotton compared to the cost of the additional technology fee. Since COP insurance covers the additional technology fee, the COP insurance should

marginally reduce the cost of Bt cotton technology fee and increase Bt plantings at the expense of other cotton seed varieties. The following benefit assessment for Bt crops was written by the EPA.

EPA conducted benefits assessment for the *Bt* plant-incorporated protectants prior to their registrations. For *Bt* corn(field corn) products, the major private benefits predicted were an increase in yield due to a reduction in insect damage and for *Bt* cotton, *Bt* potatoes, and *Bt* sweet corn the major benefits predicted were a reduction in the use of chemical insecticides yielding private benefits for the farmer and environmental benefits for society. The information available to the Agency confirms that these general predictions were accurate, although environmental benefits were difficult to quantify.

The analyses estimate benefits for the past three years of *Bt* plant-incorporated protectants and it is expected that benefits will continue around the level of 2000 for at least the next five years. If adoption of Bt plant-incorporated protectants in cotton continues to expand worldwide, the benefits should be shifted largely to consumers in the form of lower prices for corn and cotton products. It is not clear what will happen with *Bt* sweet corn and *Bt* potato benefits. It is expected that the registrants of the *Bt* products will expand the range of varieties in which they are incorporated in. This should help overcome market acceptance questions.

Most farmers growing field corn in the United States do not use chemical insecticides to control the target pests and therefore, the potential benefits were anticipated to be yield increases rather than reduced pesticide costs or reduced pesticide use. A small percent (even 1 or 2%) reduction in chemical pesticide use can be significant, since it is across the 15 to 20 million acres of corn which have adopted *Bt* corn in the United States. Farmers growing *Bt* corn who were not using chemical insecticides have seen increased yields in areas where infestations of European corn borers (ECB),Southwestern corn borers (SCB),and corn earworm (CEW)are common or reach moderate to severe levels. The number of insecticide applications to control target pests for cotton have also decreased, dramatically in some reported situations. The adoption of *Bt* potatoes and *Bt* sweet corn is far less than that in the other crops. A variety of reasons are likely to be responsible for *Bt* potatoes including the introduction of a new, highly effective chemical insecticide for the same target pest (the Colorado potato beetle).It is not clear why *Bt* sweet corn has not been widely adopted.

Although farmers pay a premium to use *Bt* plant-incorporated protectant products, farmers anticipate benefits that exceed the premium, assuming profit maximization. Actual benefits at the end of the growing season can be less than anticipated benefits, such as when corn growers face unexpectedly low ECB pest pressures, or when corn commodity prices are unexpectedly low. Another example is when cotton growers face unexpected high pest pressure from a secondary pest (such as tarnish plant bug which is not controlled by Cry proteins)and the savings on reduced chemical use never materializes.

> Farmers must make a decision on whether to plant *Bt* crops at the beginning of the season before they know the magnitude of pest problems that they will face during that growing season. This implies farmers probably do not plant the most profitable level of *Bt* crops given the technology fee charged. Farmers who recognize the problems corn borer cause and who regularly have significant corn borer damage may plant for the insurance value. We believe that, financially, this makes sense for field corn. Cotton represents a different situation. The practice has long been to plant the crop early with a high yielding short season variety of cotton so it can mature prior to the worst period of insect pressure late in the growing season. *Bt* cotton, enables farmers to continue this practice and presents favorable odds to reduce the cost of conventional pesticide use and reduce yield losses due to the bollworm and budworm insect complex. That is, the probability of financial loss from not planting *Bt* cotton may outweigh the cost of the additional technology fee. The logic of this approach depends on the historical profitability of the crop and pest pressures in the area and possibly the field.

Source: EPA Government Website

### *Topic 4 - Unit Structure*

The proposal being reviewed is to be used in a pilot program. It is not clear if the pilot program allows a producer with cotton production in pilot program counties and also in non-pilot program counties to insure: only that production within the pilot county, all of his cotton production, or none of his cotton production. The first among these alternatives, only that production within the pilot county, seems to be what is described. If that is the case, it introduces a significant "moral hazard" that should be avoided. For example, a farmer could classify production in the county outside the program. A better alternative would be to not allow a producer to participate in the "pilot program" if he had production outside of pilot counties. As unfair as this may seem, only limited producers will have the opportunity to participate due to the program's pilot character in a limited number of counties, and further constraint is needed if it eliminates an obvious moral hazard.

### *Topic 5 - Ginning Problems*

Ginning costs should not be included in the insurance because it is a post-harvest agricultural processing and value-adding activity. Likewise, cottonseed should not be included in the revenue because it is used to offset the ginning costs. Excluding ginning costs from the insurance has four advantages.

1. The COP insurance is intended to only cover farming expenses.

2. Excluding ginning costs would lower the expenses of harvest and in return, lower the cost of the insurance.

3. Monitoring the transactions between the farmer and the ginning operation could prove to be challenging since larger farmers own their own gins and smaller farmers

often have other financial relationships with the ginning operation. In addition, a farmer could claim a wide range of costs and be correct (see Excerpt 2).

4. A clearly defined end point is established as to when the insurance stops. This means the insurance will not cover storage costs or include equity payments.

### Excerpt 2 - Estimated Revenue from Cotton Seed and Estimated Cost of Ginning Cotton by Region

| State | Description | Unit | Quantity | Price/Unit | Total/Acre |
|---|---|---|---|---|---|
| Alabama | Cottonseed | Pounds | 1,120 | 0.04 | 44.80 |
| Alabama | Hauling/Ginning | Pounds | 700 | 0.10 | 70.00 |
| Alabama | Net Cost | Pounds | 700 | (0.04) | (25.20) |
| Florida | Cottonseed | Pounds | 1,120 | 0.05 | 50.40 |
| Florida | Hauling/Ginning | Pounds | 700 | 0.10 | 70.00 |
| Florida | Net Cost | Pounds | 700 | (0.03) | (19.60) |
| Georgia | Cottonseed | Pounds | 980 | 0.04 | 41.65 |
| Georgia | Ginning/Warehousing | Pounds | 624 | 0.11 | 71.50 |
| Georgia | Net Cost | Pounds | 624 | (0.05) | (29.85) |
| South Carolina | Cottonseed | Pounds | 1,253 | 0.04 | 54.88 |
| South Carolina | Ginning/Drying | Pounds | 750 | 0.11 | 78.75 |
| South Carolina | Net Cost | Pounds | 750 | (0.03) | (23.87) |
| **Southeast Average** | **Net Cost** | **Pounds** | **694** | **(0.04)** | **(25)** |
| Louisiana | Cottonseed | Pounds | 1,085 | 0.05 | 54.25 |
| Louisiana | Ginning | Pounds | 700 | 0.08 | 56.00 |
| Louisiana | Net Cost | Pounds | 700 | (0.00) | (1.75) |
| Mississippi | Cottonseed | Pounds | 1,279 | 0.05 | 63.95 |
| Mississippi | Ginning/Drying | Pounds | 825 | 0.08 | 66.00 |
| Mississippi | Net Cost | Pounds | 825 | (0.00) | (2.05) |
| **Delta Average** | **Net Cost** | **Pounds** | **763** | **(0.00)** | **(1.90)** |
| Arizona | Cottonseed | Pounds | 2,380 | 0.07 | 158.98 |
| Arizona | Ginning | Pounds | 1,349 | 0.09 | 115.06 |
| Arizona | Net Cost | Pounds | 1,349 | 0.03 | 43.92 |
| New Mexico | Cottonseed | Pounds | 1,120 | 0.05 | 56.00 |
| New Mexico | Ginning/Hauling | Pounds | 700 | 0.13 | 89.60 |
| New Mexico | Net Cost | Pounds | 700 | (0.05) | (33.60) |
| **West Average** | **Net Cost** | **Pounds** | **1,025** | **0.01** | **5.16** |
| Oklahoma | Cottonseed | Pounds | 640 | 0.05 | 32.00 |
| Oklahoma | Ginning | Pounds | 420 | 0.05 | 18.94 |
| Oklahoma | Net Cost | Pounds | 420 | 0.03 | 13.06 |
| Texas | Cottonseed | Pounds | 1,000 | 0.04 | 40.00 |
| Texas | Ginning | Pounds | 625 | 0.11 | 67.50 |
| Texas | Net Cost | Pounds | 625 | (0.04) | (27.50) |
| **Southwest Average** | **Net Cost** | **Pounds** | **523** | **(0.01)** | **(7.22)** |

* California and Tennessee Enterprise Budgets Assume Seed Revenue is Equal to Ginning Costs.

Source: State Enterprise Budgets.

# VII. Project Team Biographies

**Bruce A. Scherr, President and Chief Executive Officer.** Dr. Scherr has been with Sparks since 1987 and has worked extensively with companies to develop improved price risk management procedures, to organize and manage purchasing and merchandising programs, and to assist agribusinesses and public sector institutions in strategic and tactical planning. Formerly, he was president of Sparks, Jacobs, Scherr, Inc. (SJS), a sister company to Sparks, and president of Agri-Commodities, Inc., an agriculture consulting firm based in Andover, Massachusetts, which was acquired by SJS. Prior to forming Agri-Commodities, Dr. Scherr was a divisional vice president at Data Resources, Inc., where he developed and utilized for the public and private sectors the first commercially available econometric model for US agriculture. Dr. Scherr received his bachelor's degree from Rutgers University and his master's and doctorate degrees from Purdue University, all in agricultural economics. Currently, he is a member of the Board of Trustees of North American Electric Reliability Council (NERC). He served as a member of the Board of Directors for Desert STAR Inc., an electrical transmission Independent System Operator for the Desert Southwest from January 2000 through February 2002. In addition, Dr. Scherr has served as a member of the University of Tennessee's (UT) Institute of Agriculture Agricultural Development Board and UT's Committee for the Future. He is a member of several honorary research and agricultural societies, a member of the National FFA Foundation Sponsors' Board 2000 through 2001 and a former advisor to the President's Council of Economic Advisers and National Aeronautics and Space Administration.

**Thomas P. Scott, Senior Vice President.** Mr. Scott is head of Sparks' Project Consulting Group. His responsibilities include general consulting with a specialty emphasis on the grain industry and international markets. Specialized work has included analyses of the implications of the US/Canada Free Trade Agreement and long-term asset demand in the transportation industry. In addition, Mr. Scott has extensive experience in the agribusiness sectors of Central Europe and Southeast Asia. Prior to joining Sparks, he had various assignments in management, trading logistics and merchandising for the Continental Grain Company. He received his bachelor's degree in agricultural economics from Cornell University and a master's in business administration from the Amos Tuck School of Business Administration at Dartmouth College.

**Donald G. Frahm, Senior Vice President.** Dr. Frahm has been with Sparks since 1980 where his primary responsibilities are acreage and production research, client service and consulting as well as long-term forecasting and planning. Prior to joining Sparks, Dr. Frahm worked with two grain merchandising and brokerage companies and as a senior economist with the American Soybean Association. Earlier, he held positions at the University of Nebraska and Purdue University. He received his bachelor's degree at The Ohio State University and his master's and doctorate degrees from Purdue University, all in agricultural economics.

**Scott A. Richman, Vice President.** Mr. Richman provides management consulting services to agribusinesses, food companies and related associations, with emphasis on

financial feasibility studies, business plans and the positioning of products within specialized markets. Additionally, he has substantial experience in performing economic impact analyses and constructing market forecasts. Mr. Richman has worked extensively with the agricultural biotechnology, grain processing, and meat packing industries on such projects as an analysis of the economic impact of herbicide resistant crops, long-term forecasts of the ethanol market and the formation of a pork cooperative. In addition to work in North America, he has participated in business planning efforts in Poland. He received his bachelor's degree in economics from Vanderbilt University and his master's degree in international affairs at Columbia University where he specialized in international business.

**Don A. Riffe, Manager, Sparks Producer Services.** Mr. Riffe is the manager of Sparks Producer Services, the company's farm-level consulting business devoted to assisting farmers in marketing their crops through the development of customized farm price risk management programs. Mr. Riffe is primarily responsible for coordinating all of the Sparks Producer Services client services and reports as well as marketing and sales to the Sparks US crop production clients. Before joining Sparks, Riffe was owner of Agri-Business Specialties, LLC, an agricultural consulting firm that published the *Cottonseed Digest*. Prior to that work, Mr. Riffe was a market analyst for Land O'Lakes, Fort Dodge, Iowa, where he provided economic and agricultural market analyses and trading advice as well as managed hedging operations and developed and implemented futures and options risk management programs. Mr. Riffe also was a senior agricultural economist for the agricultural chemicals group of W.R. Grace & Company, Memphis, he spent three years as an agricultural economist with the Farm Credit Banks of Omaha, and was with the Federal Reserve Bank of Dallas for three years. He received his bachelor's and master's degree in agricultural economics from Oklahoma State University.

**William T. McCary, Jr., Senior Analyst, Crop Research.** Mr. McCary joined Sparks in 1983 and is primarily responsible for maintaining and analyzing Sparks' monthly acreage and crop surveys, monitoring US and world crop conditions, and forecasting

near-term and long-term US and world crop acreage and production. Mr. McCary, who is well respected as a crop evaluator, travels throughout the US crop producing areas and annually visits South America to evaluate crop conditions and estimate production levels there. He received his bachelor's degree in geography with an emphasis in economics and climatology from Mississippi State University.

**H. W. "Kip" Butts, Senior Analyst, Cotton.** Mr. Butts is primarily responsible for Sparks' fundamental research of cotton cash and futures markets with emphasis on hedging and trading strategies. Prior to joining Sparks, Mr. Butts was an economist for the wholly-owned Cargill subsidiary Hohenberg Bros. Co., Memphis, Tennessee, where he interpreted and analyzed farm program legislation, conducted fundamental analyses of domestic and world cotton markets, and was the firm's assistant futures trader. Mr. Butts received his bachelor's degree in economics and international relations from The University of Memphis.

**J. Alan Barrett**, **Consultant**. Mr. Barrett came to SCI from Refco, Inc., one of the world's largest futures commission merchants with its headquarters in Chicago and a branch office in Memphis, Tenn., where he advised clients on futures markets. Prior to his work at Refco-Memphis, Mr. Barrett was sole owner and president of Prophet, Inc., a registered commodity trade advisor. He also was a principal in two corporations that assisted in cotton merchandising. Mr. Barrett worked for the Tennessee Extension Service were he developed new enterprise budgets for different cropping practices. Mr. Barrett received both his bachelor's and master's degrees in agricultural economics from the University of Tennessee.