

***ECONOMIC IMPACT STUDY OF  
AGRICULTURAL  
DEVELOPMENT FOR  
VALUE-ADDED SOYBEANS***

Prepared by

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## ACKNOWLEDGEMENTS

The *Economic Impact Study of Agricultural Development for Value-Added Soybeans* was authored by Dr. Sandy Maddox. Dr. Maddox serves as director of the Lois G. Britt Agribusiness Center at the University of Mount Olive. Dr. Maddox has 40 years of experience in the field of agriculture being involved in research, extension, and academics.

Mr. Paul Dunn, owner and operator of Mule City Specialty Feeds, provided financial and production records for the development of this study to evaluate the feasibility, profitability, and impact of developing a commodity exchange with independent swine producers in a 20 county region. His willingness to provide this information will allow this study to serve as a model for other small value-added processors and producers to use as they consider developing or participating in a similar exchange.



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***ECONOMIC IMPACT STUDY OF AGRICULTURAL DEVELOPMENT FOR  
VALUE-ADDED SOYBEANS***

**PURPOSE OF THE REPORT**

The purpose of the report is to evaluate the economic advantage of the development of a commodity exchange for soybeans and soybean meal. Mule City Specialty Feeds (MCSF) is a value-added agricultural operation that initiated an exchange structured for agricultural producers growing soybeans and purchasing soybean meal for use with swine operations in a 20 county region. The exchange is structured for growers to exchange beans for finished soybean meal. The report will evaluate the advantage of the exchange to the producer and the company and the viability of the exchange system.

Expressed hesitancy for producers to enter into an exchange stems from the common practice to harvest and sell so as to satisfy input costs with lenders in a timely manner. This report will evaluate the willingness of lenders to facilitate the exchange process and allow the producer ample time to complete the production process (sale and processing of market animals) prior to debt payment and the willingness of the producer to enter into this type of financial agreement. The report will determine the value of this proposed exchange to the producer, the value-added processing company, and to lenders should participating growers select this long-term financing option.

## INTRODUCTION/ BACKGROUND

Mule City Specialty Feeds (MCSF) is a local, independent feed mill company providing feedstocks for multiple species to farmers across Central and Eastern North Carolina. The company is located in Benson, NC. The operation specializes in milling grains and supplies feed for livestock operations primarily in a 60 mile radius of its location. The company has been a landmark for Benson for more than 60 years and it has been in business since 1956. Currently, the company employs 11 individuals and processes 8,000 tons of feed equaling nearly 350 tractor-trailer loads of feed a year.

Mule City Specialty Feeds is a customer-driven feed milling operation and is able to tailor its products to meet the needs of the agricultural consumers it serves. While recognized as a manufacturing facility, MCSF is utilized by its customer base as a value-added grain production operation more than as a manufacturing company. Soybeans, corn, wheat, oats and barley are the primary grain types milled. MCSF receives both grain from multiple growers in the region as well as provides pick-up services for grain that it purchases. Products produced include bulk soybean meal, multi-species finished feeds, and by-product soybean oil.

MCSF specializes in the processing and production of a number of different feed stocks. Forty-five percent of the feed produced by MCSF is used for horse feed. Ruminants make up 20% of the market share of feed produced/purchased; swine constitutes 15% of the feed sold and poultry and specialty feeds account for the remaining 20% of feed stocks sold. The production of high quality feeds has helped MCSF sustain itself and the fact that they work closely with their customers to

deliver a quality product in a manner consistent with the volume needs of the customer. As a result of this service, MCSF has recognized a significant increase in demand for high quality soybean meal by independent swine producers across central and eastern NC.

In addition to the existing swine production customer base, MCSF also purchases soybeans annually from 50 or more farmers who have the majority of their beans under contract with other major commodity buyers. Mule City Specialty Feeds is able to purchase small loads of beans from these farmers after their contracts are met. This service affords producers the opportunity to sell rather than store smaller quantities of beans which the bigger commodity companies will not accept. The buying season for beans generally spans a period beginning in October and ending in April of each year. For the period, October 2015 through April 2016, MCSF purchased small load beans from 50 farmers totaling a volume of 50,000 bushels and purchased over this same time period from October 2016 through April 2017 a volume of 35,000 bushels from 35 farmers. The purchase of beans is an important service to the farmers and allows them to rely on the flexibility of marketing that MCSF provides. This flexibility of purchasing and marketing strengthens and enhances the economic impact of this local value-added agribusiness which provides services of value to local livestock producers and local soybean producers.

Through the purchase of soybeans and subsequent production of soybean meal for bulk or bagged feed, and soy oil, MCSF is providing a service and product that reduces the farmers' risk by diminishing price volatility in respect to raw materials sold and value-added processed materials purchased. The flexibility that MCSF provides is unattainable by other existing feed companies and as a result of this MCSF is providing a unique and needed service to independent swine

producers and soybean farmers in the region. Currently most of the soybeans purchased do not come from swine producers. However, interest has been expressed in a system of trading which could provide an attractive alternative to producers that purchase meal from MCSF. Results of a survey distributed to MCSF swine producers that were primarily bulk feed users revealed that ninety percent of respondents would consider trading soybeans produced for soybean meal. In an effort to continue to provide customers with maximum flexibility and risk management Mule City Specialty Feeds created an exchange option for its customers.

Most recently, MCSF has in an effort to continue to meet the needs of its customer base begun to process non-GMO soybeans. MCSF is the only commercial soybean processor of non-GMO beans in central and eastern NC. Some independent swine producers are beginning to consider using meal processed from non-GMO beans as a result of the changing requirements of pork product buyers. The premium price paid for swine fed meal processed from non-GMO beans is expanding as a result of consumer demand and MCSF is positioned to meet this growing demand.

## **STUDY OBJECTIVES**

Mule City Specialty Feeds made a decision to initiate and offer customers the opportunity to trade and store beans in exchange for soybean meal over a period of time equivalent to the volume of beans provided to MCSF.

Study objectives for this project are:

- To evaluate feed costs to soybean producers under current market structure for soybean meal processing versus participating in an exchange
- To evaluate the mitigation of risk and the change in profitability to producers participating in the exchange
- To evaluate economic advantages to the processor through the development of an exchange option for producers
- Evaluate lender risk reduction if producers desire to engage in a lender economic model

## **METHODS AND DATA**

Data required to compile and evaluate pre- and post-exchange impacts was collected from two sources, MCSF, and its customer base of exchange participating value-added swine producers. Data collection accumulation from MCSF resulted from face-to-face interviews with the current management. Information on history, production levels, servicing capacities, financial status, and MCSF exchange model development and impacts were collected and discussed in-depth in these face-to-face interviews.

In order to collect baseline and evaluation data from the MCSF customer base participating in the MCSF exchange, interviews were conducted after objectives were set and inputs from MCSF management were considered.

## RESULTS AND DISCUSSION

Beginning in 2015, MCSF offered independent swine producers that purchased soybean meal from MCSF to consider entering into an exchange that would allow producers the opportunity to trade harvested soybeans for soybean meal. The exchange offered producers the opportunity to store beans through MCSF and benefit from cost averaging when purchasing soybean meal.

MCSF management in an effort to introduce producers to the concept of participating in an exchange visited with a potentially interested producer to share the concept using actual bean and meal records for that producer's 2014 – 2015 year. Soybean oil was selling for \$0.45/lb. therefore the bean to meal ratio from MCSF was 1.3/1. This ratio resulted in 2600 lbs. of beans translating to 2000 lbs. of processed meal. The producer bought from MCSF 70,000 lbs. of soybean meal over a 4.25 month period from November of 2014 through March of 2015. This 70,000 lbs. of meal would have been processed from 91,000 lbs. of soybeans. The 70,000 lbs. of meal was purchased at a cost of \$19,140. If this cost is divided by lbs. of meal, 70,000 lbs., the cost per pound of purchased meal would equal \$0.27 which multiplied by 2000 lbs. is equivalent to \$546.86/ton of processed meal. The 91,000 lbs. of beans were sold in November 2014 @ \$10.08/bushel for a total harvest value of \$15,288. In summary, the volume of beans (91,000 lbs.) was worth \$15,288 at the point of sale or \$19,140 as an added-value bean meal. The producer added \$3,852 in value to the commodity in 4.25 months. If meal needs remained the same for a 12 month period the producer could realize a profit of \$10,876.

Mule City Specialty Feeds also shared their interest in pursuing an exchange using the same example. If the 91,000 lbs. had been stored processing would have resulted in a loss in poundage. Moisture and trash would have accounted for a loss of 6,400 lbs. and 2,700 lbs. respectively as well as 11,900 lbs. of oil leaving 70,000 lbs. of value-added meal processed. The oil per pound was worth \$0.45/lb. so 11,900 lbs. of oil would be worth to MCSF \$5,355.

With this information in hand, the producer did decide to participate the first year the exchange was offered. This was the only producer that opted to store and exchange beans for soybean meal. The producer is an independent swine farmer operating a farrow-to-finish on the ground operation with 140 sows. Most of the product sales from this operation are sold to restaurants. A small volume of produced swine are sold as whole hogs. The producer does produce beans on about 200 acres and decided to store a portion of harvested beans. The producer had sold beans to MCSF for many years and began purchasing meal from MCSF in 2008 and currently uses MCSF exclusively for soybean meal needs. The producer decided to enter into the exchange because MCSF was a local business and because the management of MCSF had taken time to work through the potential cost benefits to the producer. The volume of beans stored with MCSF was 111,280 lbs. The producer sold the remaining beans harvested at the time of harvest. The sale of harvested beans allowed the producer to realize income immediately after harvest thus allowing input costs for the production of beans to be reconciled. By storing a portion of the harvested beans, the producer eliminated input costs and avoided the need to request that a lender extend credit until final product sales were acquired. While lenders contacted indicated the desire and ability to work with producers to extend debt service until final product sales (marketable pork sales) were made and



Data indicated that the volume of stored beans and demand for soybean meal allowed the producer to utilize the exchange for a period of 6 months. It might be noted that the Freight on Board (FOB) Fayetteville price paid for beans increased from \$8.60 per bushel of beans in December 2015 to \$11.30 per bu. in June 2016. The soybean meal tonnage price for processed meal also increased from \$400 per ton to \$510 through the same period (December 2015 through June 2016). Mule City Specialty Feeds FOB price for beans followed the increasing price trend from December through June, but remained below the FOB Fayetteville bean price. The average per bushel differential for the value of beans equaled \$0.17 per bushel.

The cost of soybean meal processed and delivered from stored beans totaled \$17,087.00. Had the volume of stored beans been stored on-farm and sold at the current market price at the time of processing, income from beans would have totaled \$17,390.00. This represents a difference of \$301.41 that the producer would have been paid at market value. However, this calculated income does not reflect the cost to the producer of transportation of beans to the buying station nor the on-farm cost of storage. MCSF did not charge for storage of beans retained from producer nor did MCSF charge for delivery of the meal to the producer over the 6 month period. Had the producer decided not to enter into the exchange and decided to sell the beans at the time of harvest (12/17/15), the value of beans sold would have been 111,280 lbs. of beans/60 lbs. per bushel x market price FOB Fayetteville (\$8.60) for an income of \$15,950.13 or \$1,136.86 less than the value of the processed soybean meal received through the exchange demonstrating the market advantage of storing beans.

Obviously, no business can provide services and receive no compensation for these services.

MCSF however is able to provide these services at competitive rates and receive needed compensation.

MCSF provided meal to the producer based upon a ratio of beans to meal of 1.4/1.0 or 2800 lbs. of soybeans to 2000 lbs. of processed meal. The loss is attributed to moisture, trash, and extruded oil. Ultimately, MCSF is providing a service for the byproduct that is unusable by the producer. As an example, of the 111,280 lbs. of beans stored and converted to meal, a discount of 7% was attributed to moisture resulting in a volume of 103,490 lbs. of dry beans to be processed. MCSF is capable of processing 1980 lbs. of soybeans in an hour. Using this information, the total time to process the 103,490 lbs. of beans ( $103,490/1980$  lbs. processed per hour) was 52.27 hours. MCSF is capable of producing 1560 lbs. of meal per hour, therefore a total of (52.27 hours X 1560 lbs. of meal/hour) 81,541 lbs. of meal were produced. The producer received from MCSF 79,515 lbs. of processed meal. MCSF retained 2026 lbs. of meal processed. The income resulting from this retention and sale of meal ( $2026$  lbs. meal retained/ $2000$  lbs. = 1.2 tons x \$440/ton) was \$448.80.

Additionally through processing, 280 lbs. of soy oil is produced per hour. As stated, processing time for the beans stored was equivalent to 52.27 hours. Total oil produced would be equivalent to 52.27 hours x 280 lbs. of oil equaling 14,635 lbs. of oil extruded. Pricing of oil during this time period was equivalent to \$0.30 per pound. MCSF retains the oil for feedstocks and sells that volume in excess of their need to multiple markets. Income relative to the sale of the oil

byproduct from this exchange transaction (14,635 lbs. of oil extruded x \$0.30 per pound) equaled \$4,390.68.

MCSF can attribute a total gross income (\$4,390.68 soy oil sales + \$448.80 value of meal retained) of \$4839.48 as a result of this exchange. Storage costs if charged would equate to \$0.30/bu. (111,280 lbs. beans stored/ 60 lbs. bu. x \$0.30/ bu. to store) or \$566.00. Transportation costs if charged for 8 deliveries would have been charged at \$0.15/mile resulting in estimated charges of \$100. Thus net income to MCSF for this producer exchange would be \$4.183.08.

Advantages exist for both MCSF and the producer in consideration of participation in an exchange. As a result of the exchange, MCSF does not purchase beans from participating producers therefore reducing the debt service required to meet processing demands of soybean meal users. MCSF avoids paying cash interest on working capital or capital expenditure loans through the exchange thus reducing the cost of borrowing.

MCSF serves as a storage option for producers and allows those participating to cost average the purchase of soybean meal across a period of months dependent on stored volume of beans while MCSF reduces its own inventory risk. The flexibility in soybean meal orders over the period of the exchange is noted as a positive for producers as it allows them to manage their soybean meal inventory based on production rather than on storage capacity. It reduces the risk for producers by allowing producers to limit the volume of meal delivered and stored on-farm based on their immediate needs rather than the predetermined processor minimum delivery meal volume.

MCSF, as a small value-added processing business through the exchange, ensures a portion of the market share. The participating producer/consumers are dependent on MCSF to properly store and process a quality product while delivering the product at an average cost. The producer/consumer again averts risk in storage and cost while receiving a desired quality product.

Producer 1 did not participate in the exchange during the 2016 – 2017 harvest/exchange, but has committed to store beans for the 2017 – 2018 harvest/exchange. The producer indicated they had not participated in 2016 – 2017 because they had harvested beans late and the quality was poor with mold being a primary concern. The producer did not want to risk storage of such poor quality beans for fear of loss. The producer indicated that he was able to participate because he had through the years evaluated the final product price point and his ability to do this allowed him the option to store beans whether to sell later or as a part of the exchange and still meet his input cost obligations.

The producer indicated he would encourage others to consider the exchange. He noted that the convenience of access to MCSF, the quality of MCSF soybean meal and the knowledge of the management at MCSF were, in addition to the benefit of cost averaging, the reasons that he had participated and would participate again.

A second producer entered the exchange during the 2016 – 2017 harvest/exchange period.

Producer 2 owned farmland, but rented this land to another producer who produced beans during the 2016 growing season. Producer 2 worked out through a reduction in rental payment to have 46,445 lbs. or 774 bushels of beans delivered to MCSF to be stored for exchange. The producer



Data indicated that the volume of stored beans and demand for soybean meal allowed the producer to utilize the exchange for a period of 12 months. Freight on Board (FOB) Fayetteville price paid for beans fluctuated from \$9.60 per bushel of beans in December 2016 to \$10.60 per bu. in February 2017 decreasing to \$9.20 per bushel in June 2017 and rebounding to \$9.96 in November 2017. The soybean meal tonnage price for processed meal also increased from \$450 per ton to \$592 through the same period (December 2015 through November 2017). Mule City Specialty Feeds FOB price for beans followed the fluctuating price trend from December through November, but remained below the FOB Fayetteville bean price. The average per bushel differential for the value of beans equaled \$0.35 per bushel.

The cost of soybean meal processed and delivered from stored beans totaled \$6,877.73. Had the volume of stored beans been stored on-farm and sold at the current market price at the time of processing, income from beans would have totaled \$6,995.49. This represents a difference of \$117.76 that the producer would have been paid at market value. However, this calculated income does not reflect the cost to the producer of transportation of beans to the buying station nor the on-farm cost of storage.

Sale of beans at the time of harvest (12/13/16) would have resulted in the producer receiving \$7,431.20 FOB Fayetteville (\$9.60) or \$553.47 more than the value of the processed soybean meal received through the exchange. However this price differentiation does not take into account transportation costs at harvest. Additionally, MCSF beginning in June as a result of the producer's mill being out of operation raised the bean to meal ratio from 1.4/1.0 to 1.6/1.0 as a

result of using full fat beans to formulate a complete feed for Producer 2 while the producer's mill was non-operational. The use of full fat beans allowed for the feed formulation to include wheat rather than a higher volume of corn thus resulting in a higher protein feed at a cheaper price and the exchange could accommodate this change while remaining a constant for the producer with no additional expenditure needed to overcome the operational failure which lasted from June through August. The cost per ton on meal was noted to have increased significantly during this three month period, but the exchange buffered the impact of this increase.

MCSF provided meal to the producer based upon a ratio of beans to meal of 1.4/1.0 or 2800 lbs. of soybeans to 2000 lbs. of processed meal for the months of December 2017 through June 2017 and during the months of October and November. During this time 39,200 lbs. of beans were stored and converted to meal based on this ratio. A 7% discount was taken for moisture on the volume of 39,200 lbs. resulting in a dry volume of beans equaling 36,456 lbs. MCSF through 18.41 hours of processing produced 28,723 lbs. of meal at the normal ratio. Soy oil produced equaled 5152 lbs. (280 lbs. x 18.4 hours) valued at \$0.30/lb. resulted in gross income to MCSF of \$1,545.60. Volumes used in June through August resulted in 3,240 lbs. of beans processed and used as full fat beans at a volume of meal produced of 2025 lbs. for total of 30,748 lbs. of meal produced. No oil resulted from the processing of meal from full fat beans. MCSF used 3240 lbs. of full fat beans minus 7% loss (3240 lbs. x .07) for a total of 3013 lbs. of full fat beans. Two thousand and twenty-five lbs. of meal was of which MCSF retained 988.2 lbs. of meal priced at \$533 per bushel for a total gross income for full fat beans of \$263.35.

MCSF can attribute a total gross income of \$1,808.35 as a result of this exchange. Storage costs if charged would equate to \$0.30/bu. (46,445 lbs. beans stored/60 lbs. bu. x \$0.30/ bu. to store) or \$232.00. No transportation costs were incurred as the producer picked up meal, therefore the net income to MCSF for this producer exchange would be \$1,576.35.

## CONCLUSIONS

Both producers indicated benefits from the utilization of the exchange. Neither producer expressed specific drawbacks to the exchange. Producers expressed the exchange reduced the impact of price fluctuations common with commodity prices. It was noted that the exchange allowed for cost averaging which was of benefit to smaller independent producers. Additionally, the convenience of being able to get the volume of meal needed when needed was invaluable to producers. Other noted advantages were that the exchange allows for planning for the buying season. The ability to “draw off of an investment” through the exchange was noted as a positive again to relieve risk of price fluctuations and need for more capital to address these fluctuations. Finally, the need to store 2 tons of meal rather than 24 tons as is common when purchasing through other processors, was a very attractive to producers. It was noted that the ability to order and store smaller quantities of meal greatly reduced risk of loss as well as storage and management costs.

Producer 2 additionally had the opportunity to work closely with MCSF to remedy an operational failure at the producer’s facility. This relationship allowed for MCSF to reduce feed costs while

improving feed rations during this time, again recognizing the benefit of working with a small value-added soybean processing facility to maintain flexibility and regulate costs while receiving a quality product.

Another advantage that could be realized by producers would be to store beans with MCSF and delay exchange of beans based on market value of beans. It may be advantageous to producers to evaluate past market trends and expected market trends to determine when per bushel prices can be expected to increase. Trends indicate that bean prices, depending on environmental and other market events, are traditionally lower during and after harvest when volume of commodities are greater. Conversely, prices increase as storage volume decreases which occurs traditionally in late spring to summer months. While Producer 1 only stored enough beans to exchange for 6 months a greater advantage in cost averaging may have been recognized if soybean meal had been purchased during months that traditionally exhibit lower per bushel bean prices and exchange beans used to cost average during months of increased bean prices.

Producers indicated that they would encourage others to participate in the exchange, but noted that various reasons including adopter apprehension and lack of understanding of the process were key reasons in hesitancy to participate.

The objective to evaluate lender risk reduction if producers desired to engage a lender in the development of an economic model was not realized as neither of the producers that participated in the exchange desired to extend credit to engage in the exchange. One stored only a portion of

their harvest in the exchange and the other used rental reductions to accommodate the volume of beans to be stored in the exchange. It does not appear that producers are ready and willing to invest an entire bean harvest into an exchange at this time. The need for the exchange to be confirmed to be advantageous or at least not detrimental to the bottom line and operational management is still a deterrent to producers until early adopters confirm its value. Additionally, swine producers would need to have a strong product market and be certain that their pork prices are adequate to allow for them to rely on these sales to cover input and operational costs. Underpricing of pork products could limit the ability of producers to realize the needed profit to enter into an exchange or work with lenders.

The value of the exchange has been recognized by both the producer and the processor with MCSF able to reduce its debt service by not having to purchase beans. The ability to exchange product allows MCSF to avoid borrowing money needed to purchase the beans and avoids paying interest on borrowed funds. This factor helps MCSF to ensure its financial stability and reduce risk allowing for the sustenance of MCSF, a small agricultural business which supports small family in the region.

The exchange demonstrates the ability of MCSF to promote efforts that assist producers in retaining flexibility of operation while maintaining the ability to purchase a quality of product at an affordable price or through an innovative opportunity such as an exchange. These efforts help to ensure the viability of small family farms in the region served.

# APPENDIX



April 1 2015

DeWitt Hardee, Director  
Farmland Preservation Programs  
NC Department of Agriculture  
Raleigh, NC 27601

Re: Mule City Specialty Feeds, Inc.

Dear DeWitt,

First Citizens would consider loaning funds to small swine producers that produce their own soybeans, using the "value added soybeans processing model" for these small swine operations. This model allows the loan to be repaid as the swine is sold, instead of the loan being repaid at soybean harvest time.

Based upon the business model that I have reviewed, this new "Value Added Soybean Processing Model" should assist these smaller producers with adding additional revenues back to their operations. If you have any additional questions, please feel free to contact me at 919 989 3283.

Respectfully,

A handwritten signature in black ink that reads 'Michael Creech VP'.

Michael Creech, VP.