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# Arkansas Broiler Enterprise Assessment Tool ... AR B.E.A.T

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Arkansas Broiler Enterprise Assessment Tool - AR B.E.A.T

An Undergraduate Honors Thesis

in the

Department of Poultry Science

Submitted in partial fulfillment of the requirements for the  
University of Arkansas  
Dale Bumpers College of Agricultural, Food and Life Sciences  
Honors Program

by

Christopher R. Sims

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**Arkansas Broiler Enterprise Assessment Tool... AR B.E.A.T**

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## **Abstract**

Poultry operations require numerous variable inputs for the operation to run. Due to this it is extremely difficult for poultry growers to estimate the financial capacity of the operation. The poultry industry had evolved over the years from back yard non-commercial hobby farms to vertically integrated contract farms. These changes have made it extremely important that poultry growers fully understand the revenue, expenses, and income associated with the operation. Under the contract system, it is difficult for poultry growers to have a full understanding of and expectation for their projected expenses and revenues from the operation due to variability in production conditions and prices and the flock-to-flock variations in revenues that result from the tournament pay system. Therefore, accurately estimating their projected cash flow becomes problematic because of the method used to determine their payments as well possible bonus incentives. In addition, traditional poultry operation budgets are therefore often difficult to use and interpret. Projecting cash flow into the future is complicated by unforeseen circumstances such as changes in revenues and costs that normally occur year to year (Cunningham & Fairchild, 2012).

The purpose of this project is to create an excel program to help poultry growers better estimate and analyze the cash flow of their operations. The program will take into account a major portion of the possible revenues and expenses the grower may have related to the broiler operation. Taking into account the major sections will help give the grower as accurate as possible a portrayal of their financials. The excel program being created, called Arkansas Broiler Enterprise

Assessment Tool (AR B.E.A.T), will allow for growers to have the ability to input information regarding their own operation rather than using generalized budgets. AR B.E.A.T is designed for use by contract broiler growers that are working directly with integrators.

All independent contract operations are different. Therefore, the program uses a panel of 7 growers along with current research to build the default calculations. As the user works through the program, they will enter their own information and the totals will recalculate based off of their inputs. In the event growers do not have their own information, the panel defaults are there for users that do not have full information about the operation. It is great for potential growers to gain an understanding of the potential revenue, expenses, and income to expect from the operation. Growers can also utilize the program to run “what if scenarios” to determine how changes in costs and other areas will impact the overall financials of the operation. AR B.E.A.T is not perfect and it does have its limitations just like other financial analysis tools. Ultimately it comes down to the growers’ decisions and management of the flock.

## **Background**

Poultry production has drastically evolved for the good over the past few years and even more so the past few decades. Broiler operations have shifted from back yard farms to vertically integrated companies controlling the market. In 2013, broiler production alone contributed to approximately 3.6 billion dollars in revenue for Arkansas (Association, 2015). Arkansas is the number two-broiler production state and produced over 5.9 billion pounds of broiler meat in 2013 (English, Popp, & Miller, 2014). Arkansas broiler exports are valued at \$533 million. Over the past 50 years the number of companies in the poultry industry has declined from around 250 companies to less than 50. The following research and purpose of building the economics analysis tool is focused on users that are broiler producers contracted with company integrators.

Poultry production is a vertically integrated business with a significant amount of resources directed towards product development and marketing and this makes it hard for independent growers to compete. It has become extremely difficult for individual and small hobby poultry growers to enter the commercial market when they lack access to a cost competitive feed supply, processing facilities, and product storage and marketing and distribution options. If individuals want to enter the poultry business, the only sure way for them to reach a reliable market is as an independent contractor with an integrator firm. By contracting with an integrator the growers greatly reduce their market risk; however, they still have a significant financial risk. This project is focused on contract broiler producers that work directly with integrators.



An independent contract grower is one that will sign an agreed upon contract with an integrator to produce chicken for them with specified terms for each party. “The integrator directs and oversees the production process and serves as overlord to the contract grower” (Domina & Taylor, 2010). The integrator owns the chicks, feed, and provides service technicians to help the grower with the management of the flock from placement to market weight. Growers cover the expenses for everything else going into growing and managing the birds. They provide the houses, equipment, utilities, labor, and management. It is in the best interest of the potential growers to fully understand the contract terms prior to signing. Incentive type pay, production terms, required management practices, base pay and other relevant information are explained in the contract.

Each independent grower must make substantial long-term investments when building their initial operation. “Although poultry contracts offer benefits to growers such as reduced market risk, reduction of production responsibilities, lower operating capital and relatively predictable incomes, they do not guarantee success nor do they eliminate all risks (Cunningham & Fairchild, 2012).” Due to the substantial investments that growers make, it is vital that they understand their finances and manage the cash flow of their operations.

Because poultry growers invest a large amount of capital into building their operations; they need to have an idea of the expected cash flow to ensure continued operation. Due to the lack of comparable information available to integrators, they are unable to provide fully adequate useful information to the growers. Integrators do have company farms on which they track data. However, with the large amount

of variable inputs that go into an operation it is difficult for integrators to provide accurate information to portray the financials for an independent grower. Because of this, growers often perceive the integrator is keeping information from them. This lack of available information creates distrust between the grower and integrator.

Under the contract system, it is difficult for poultry growers to have a full understanding of and expectation for their projected expenses and revenues from the operation. Poultry growers typically are not able to accurately estimate their projected cash flow because of the method used to determine their payments as well possible bonus incentives. Traditional poultry operation budgets are, therefore, often difficult to use and interpret.

Grower pay is based on a tournament system where growers are ranked against one another based on performance factors such as feed conversion, average weight of the flock at market and livability (MacDonald, 2008). Their tournament rank is calculated based on flock performance in their grower pool, defined as a given processing week for growers that are in the same defined geographic area. The grower, based largely on his or her management skills, hard work and dedication, plays the primary role on where they place in a given week (Rodriguez, 2001). Once a grower's flock is sent to processing, the grower will then compete for their "ranking" against the other growers who have also had their flocks processed during the "settlement" time frame. The integrator takes all growers in a given "pool" and calculates an average cost from their numbers. This yields the average cost on which the growers receive either bonuses or discounts from their contracted rate per pound live weight. When a grower's costs for overall production of the

birds for that given week falls below the average they are given a production bonus based off the mean. However, when a grower's costs rises above the average they have pay deducted from their flock settlement check. Total pay is based upon base pay, tournament ranking and condemnations. Base pay is set per pound of live weight; all growers begin with this rate regardless of where they rank in the tournament.

With all of the possible changes that can affect a poultry producer, estimating their budgets in a quick way is complex. There are a number of things, from disease outbreak to where they will rank in a production week, that all determine how much money they will make.

## **Problem**

Growers need to better understand their operations financially, particularly their expenses. Growers also need to carefully study information provided by the integrator and the lender about their potential revenues and costs so that they can modify their budget and cash flow statements as needed to determine potential returns (Rhodes, Timmons, Nottingham, & Musser, 2011). With the large capital investments that growers make, it is important that they have reasonably accurate and understandable estimated budgets. Poultry operations have a lot of inputs that can vary at times in terms of costs. Lack of information from the integrator and lender leads the grower to have erroneous expectations that may later lead to trust issues. Integrators inform new growers that high loan payments are expected, albeit for a brief time.

Projecting cash flow into the future is complicated by unforeseen circumstances such as changes in revenues and costs that normally occur year to year (Cunningham & Fairchild, 2012). It is critical for the grower to understand that over the life of poultry houses there will come a point where additional investments for housing upgrades will be necessary to maintain production efficiencies and competitiveness. Oftentimes, just when growers believe they are about to have their debt paid off, it is time for them to make upgrades to their houses or new mandates are passed. Newly available technologies, or regulatory actions by governmental agencies, may result in the need to upgrade facilities, something that is often mandated to the grower by their integrator. It is crucial that growers really understand the financial intricacies of a broiler operation to remain viable both in terms of cash flow and profitability.

The purpose of this project is to create an excel program to help poultry growers better estimate and analyze the cash flow and net income of their broiler operation. The program will take into account a major portion of the possible incomes and expenses the grower may have related to the broiler operation. It is extremely hard to estimate all revenues and expense because all operations are different. In addition, not all growers account for costs and revenues in a comprehensive manner. Those considering entering independent contract growing business will have no access to reliable third-party information. Therefore, AR BEAT utilizes panel data so that default values are available for estimation purposes.

The AR B.E.A.T. panel consisted of 7 growers across the state of Arkansas with diverse operation sizes. The excel program being created, called Arkansas

Broiler Enterprise Assessment Tool (B.E.A.T), will allow for growers to have the ability to input information regarding their own operation rather than using generalized budgets. B.E.A.T will produce economic calculations with the given information inputted by the user to estimate their anticipated revenue, expense, and income for the operation. This information will help the user to better predict their loan repayment ability and profitability of the operation. AR B.E.A.T is a tool for contract poultry growers to get a better understanding of the financial capacity of their operations. It includes opportunity costs of their land as well as labor associated with the poultry houses. Farmers typically do not include these costs or the value of their management with the operation. A grower's management directly affects their bottom line and how well they do with overall production (Goodwin, Ahrendsen, Barton, & Denton, 2005).

Another primary benefit of AR B.E.A.T is that it allows the grower to analyze different scenarios to see how their operation will be impacted by changing prices and management decisions. "Growers should spend some time exploring "what if" scenarios to see what their options under the contract will be if problems are encountered" (Doye, Freking, Payne, & Ferrell). Importantly, AR B.E.A.T is designed so that it will not save any information that is entered by the user. When the user has completed their data entry for each scenario, they have the option to print out their inputs and the results. Once they log out, the program automatically reverts back to default information. By the program not saving anything, it gives the grower reassurance that no one is gathering their business information, which should result in greater levels of comfort when using the program, particularly if assisted by

extension staff, poultry integrator field personnel or lenders. In addition, as previously mentioned, in a tournament system that pays growers based upon competition with other growers in a settlement week, growers do not like to share information and management styles that may enable them to place higher in the grower pool each time. The constant competition to be at the top of their grower pool results in growers being reluctant to allow anyone to know details of their business operations. Therefore, confidentiality is a major focus behind the program.

AR B.E.A.T is a social science based enterprise tool for the growers' use. All the information that has been used in the calculations comes directly from other growers and most recent research that has been done. Helping to build the trust and sense of security with the grower is crucial in developing a user-friendly business management tool that is accepted and adopted by growers.

Producing poultry and owning an operation is an extremely tedious job. Many of the operation's variable costs and production factors constantly change, some daily and others monthly. The framework presented herein uses grower panel data to derive average costs for each input and activity that by nature are fairly precise; calculations take into account variability of inputs. Among the constant changes, utilities are one of the biggest. Poultry growers constantly watch and regulate the environment within the house. As the birds age they need less heat because they create a substantial amount of residual body heat. Another big utility change is lighting. As the birds age the amount of light and the intensity of the light is drastically reduced, changing the kilowatt usage. Fuel usage and prices vary at all times of the year depending on availability and seasonal weather effects. Due to all

of the variability within a poultry operation from utilities to the simple management styles it is very difficult to make reasonable estimates the financial capacity of operations.

## **Literature Review**

Broiler production is a long-term commitment for growers; they need to have full consideration before they choose to enter the market. Vertical integration with the poultry market is a very unique way of doing business. In this way, the integrator has control of the birds that the growers receive and how often. “Under the dominant business arrangement, the integrator owns the chicks and feed, while farmers, commonly called contract growers, carry out actual production, or grow out, from chicks to birds ready for processing” (Domina & Taylor, 2010). The integrator oversees production of the birds and helps the grower achieve maximum production. Integrators provide service technicians that assist growers when they have questions about the birds. For the integrator, this is an effective way to ensure contract growers are doing what they are supposed to and are following all the contract guidelines. Integrators require growers to provide state of the art facilities along with labor and management for the operation, these costs for a typical facility reach up to one million dollars (Domina & Taylor, 2010).

### ***Signing the Contract***

Because of the high capital costs and large amount of debt it takes to establish a poultry operation, once one enters the life it is hard to get out of the business. Poultry contracts have evolved over the course of time with control given to the integrator and the allocation of risk between the grower and integrators.

These contracts have allowed improvements in the overall production quality of poultry, and they have shifted much of the total risk from the growers to integrators. Knoeber and Thurman found that as much as 86 percent of total risk is borne by the integrator under the present system, as the integrator absorbs input and output price risks and the grower retains production risk. “Others believe that the integrators are provided with market power through the use of contracts because in the long run, the alternative markets for grower are eliminated and farmers are left with no bargaining power” (Rodriguez, 2001).

In most poultry contracts, the integrator will only guarantee the grower a single flock. However, most integrators keep sending flocks to the grower at regular intervals as long as the market is doing well and the grower follows the contract. A concern that growers have is when integrators profits are reduced or negative growers do not know if they will continue to receive birds at the scheduled times; periodically, integrators may increase time between flocks in response to market signals. Contracts serve as protection for both the grower and integrator. “Before agreeing to produce broilers under contract, the grower should thoroughly examine the contract and be familiar with its terms” (Rhodes, Timmons, Nottingham, & Musser, 2011). The contract system does give some advantage to the grower; it shifts some of the price risk to the integrator. Conversely, with the major expenses and capital used for the operation this is not extremely noteworthy. “As a result, price risk and some production risk are shifted from individual growers who may be quite risk averse to owner of the integrator companies” (Knoeber & Thurman, 1995).



Sometimes the integrator will provide the grower with incentives so they may realize a greater margin. Incentives may be for propane or natural gas use, utilities, and sometimes for retrofitting their houses. This is mutually beneficial because it rewards the grower for doing better and maintaining production, thus helping to ensure a constant supply of broilers for processing more efficiently in terms of costs per pound. “An additional payment incentive is usually included in the agreement between the integrator and the grower. The incentive payment may be based on feed conversion and/or cost of production” (Doye, Freking, Payne, & Ferrell). Many integrators may not be fully capable of providing completely accurate information to new broiler producers concerning all of the details about the challenges of managing their production, especially in terms of costs and net margins they may realize. This is not because the integrator is trying to be deceitful to the grower, however. It is because the integrator may not have all of the correct information; the integrator does not want to provide false information to the growers. If they do and the profits are not what the integrator discussed then the grower is understandably upset and the relationship is likely to deteriorate, often to the detriment of both parties.

### ***Getting Paid***

Growers are paid based on the number of pounds of usable broilers they send to the plant. Contracts give the amount in base pay that the grower will receive for each pound of meat. For the grower, this is a great way for them to have an idea of potential income for each flock they process.

*“Many contracts include a payment based on a “tournament” system in which growers are placed into groups; the growers’ performance is compared to the rest of the group and adjustments to grower payments are made based on their performance relative to the group” (Doye, Freking, Payne, & Ferrell)*

Growers are competing against one another at the time of settlement and are ranked based on their flock’s performance comparatively. The grower never knows where they are going to place when they sell. This results in fluctuation of their received payment for each flock depending on how the other growers perform that sold broilers at the same time.

Integrators do all they can to fill the producers houses to ensure maximum profits and minimized costs are incurred for both. A great deal of the income that growers receive is how well he or she follows the integrators’ management program. If they can implement the program effectively, then they have a higher probability of maintaining a steady income.

The chicks are distributed to the grower in no particular order. When the chicks are hatched, the integrator delivers the total number of chicks to the growers that need them. This can be looked at in the way that the chicks are a product being produced. Contracting growers are given a delivery date for more chicks. The chicks that are delivered were hatched appropriately for that date. Growers sometimes feel like the integrator will intentionally give a bad batch of birds. The birds are what the integrator has at the scheduled placement time. All of the birds come from the same line of genetics. In the event growers get ‘bad chicks’, generally from breeder hens at

the beginning or end of their laying age, the integrator also takes a relative loss; it is a non-optimal situation for the grower and integrator.

### ***Upgrades & Fixed Costs***

“A USDA Survey update revealed that 49% of broiler growers were required to make capital investments in 2004, and that this investment in the single year averaged \$49,037 per grower” (Domina & Taylor, 2010). In today’s dollar, that is approximately \$60,932 spent in upgrades to an operation in one year. Upgrades are costly to the grower; however, the large-scale upgrades are not as constant as the required routine maintenance. Maintenance costs include new lighting, water line replacement, water nipple drinkers, fan upkeep, and house insulation. Such small, constant ‘upgrades’ often result in growers feeling pressed to realize a gain in their equity position. It is important that growers really consider the upgrades they are doing and look at all of their options to make sure that they will be able to see the benefit of the costs. Petrikova found that “propane cost per gallon confirmed the impact on farmers’ expenditures for LPG, as well type of housing (retrofitted drop ceiling) clearly indicates that renovation of houses led to decreasing gas usage and decreasing expenditures” (Petrikova, 2011).

For growers “The largest costs are depreciation and interest on the buildings and equipment and other investments for the operation” (Rhodes, Timmons, Nottingham, & Musser, 2011). Although the houses and equipment are generally prescriptive in nature, growers need to carefully consider the support equipment needed to maintain the operation and land to keep them in best possible condition

by obtaining dual-purpose equipment that has a long life and is effective, thereby reducing costs.

Cash flow for broiler operations is positive for the first year; however, the net income is negative due to the amount of fixed costs that must be accounted for, including depreciation and interest payments on buildings and equipment, taxes, and insurance. “Expenses are reduced in the 8<sup>th</sup> year when the support equipment is paid and the 11<sup>th</sup> year after houses and equipment are paid” (Denton, Barton, Goodwin, & Ahrendsen, 2000). Each of these costs should be accounted for and planned into the management plan so that the grower can be ready to pay for routine replacement costs. “When looking at profitability, there is a large increase in the eighth year, which is attributed to the reduction of interest and depreciation expenses associated with the initial equipment. The second large increase in net income is in year 16 when all debt is retired and assets are fully depreciated” (Denton, Barton, Goodwin, & Ahrendsen, 2000).

### ***Propane & Electricity Usage***

Over the years, poultry growers have experience significant increases in operating costs for their operations. This is largely due to increasing costs of heating fuel and electricity. “With these increases it means that every effort must be made to find ways to reduce usage that will not affect the bird environment or performance in a negative way” (Simpson, Donald, & Campbell, Evaluating Cost Trends to Plan Profit-Saving Strategies, 2007). Last year alone, Arkansas poultry growers experienced an increase in the price of propane from \$1.79 to \$4.00 per gallon in less than a week. When this happened many poultry growers (especially

those that tend to fall in the bottom portion of each pool) did not know if they would be able to financially survive the high price of propane. Since last January, when propane hit an all-time high, it has dropped to more a historically consistent price. However, for poultry growers to maximize the flock potential, they have to keep houses at the appropriate temperature, requiring continued propane purchases. Regardless of a price increase for fuel, growers will still receive the same pay per pound of bird. Growers purchase the most propane in fall and winter months. According to Petrikova, when “propane gas cost per gallon increases by 1 percent, the average daily propane cost per house increases by \$20.73” (Petrikova, 2011).

The large increase in propane price prompted growers to consider alternatives for fuel and heating. Some key ways for growers to combat the rising costs are to; negotiate pre-payment terms for next year’s propane, or work with other growers to get a group to get a much larger quantity of propane for the company to negotiate.

*Petrikova found that pre-purchase propane “has the best results over alternatives in 2009 when LPG cost per gallon was lowest (0.95 \$/gal). We believe this scenario can save considerable funds to farmer when he pre-purchase propane on spot market but he has to have good knowledge of the market prices (not only energies but also factors that can have an impact on energy prices) to predict the best time to pre-purchase LPG. (Petrikova, 2011)”*

Another potential way is for a grower to become a bulk buyer himself and purchase large quantities when the price is low (Donald, Eckman, & Simpson, Alternatives to High Propane Prices, 2004). However, before a grower decides to

employ this strategy they really need to take into consideration many things  
(Campbell, Wimberly, Simpson, Donald, Runge, & Macklin, 2009)

- 1) Will the new system heat the house properly, providing a good uniform environment?
- 2) Should consideration of an alternative fuel system be top priority, or are there other ways to control heating.
- 3) Will it be sufficient enough so I will get sufficiently lower operating costs?
- 4) Can I buy and install an alternate fuel system for a price that will give me long enough service life (with lower operating costs) that I can expect to repay all costs of the new system with the quantity of propane that I have saved?
- 5) What assurances do I have that the alternate fuel will be available in sufficient quantities and at a reasonable price over enough years to enable me to recoup my investment?

Alternate fuel systems have improved tremendously over the past few years. It is still in the best interest of the business that the grower really considers all of the options before pursuing another source. Propane prices vary greatly depending on the time of year along with supply and demand conditions. "The price of propane is usually lowest in spring and summer, and price is determined by supply at a single source" (Donald, Eckman, & Simpson, Alternatives to High Propane Prices, 2004). Petrikova found that "growers can save considerable funds when they pre-purchase propane on spot market but they need to have a good knowledge of the market prices to determine the best time to pre-purchase" (Petrikova, 2011)

In terms of the variable costs, some are more difficult to account for than others, which make understanding the financials for the operation even more complicated. The biggest variable costs that a broiler producer will realize are utilities. Electricity costs are trending upward just like propane costs are. They are the second largest cost item in dollar amount. Growers need to check around with their utility providers for possible incentive programs or buying groups to help reduce the costs.

Utility bills must be paid when sent. “Growers must either have the cash or be able to borrow the funds to cover the costs” (Rhodes, Timmons, Nottingham, & Musser, 2011). Constantly there are new technologies with equipment, insulation, ventilation, control systems, and hose sealing are emerging. Growers who want to keep costs at a minimum must strive to keep their management up to date and evaluate new technologies on a pay back analysis basis (Simpson, Donald, & Campbell, Evaluating Cost Trends to Plan Profit-Saving Strategies, 2007). With the constant rise in electricity costs it is important to monitor house tightening and insulation improvements. Ensuring a tight house will help to reduce electricity costs dramatically.

A big part of the electric bill comes from the fans in the houses. Therefore, fan efficiency and maintenance are a key focus. Growers need to ensure that the engines and belts are maintained properly to get maximum performance. When the grower considers upgrading the existing fans, it is important to consider fan energy efficiency and long-term operating costs. In evaluating fan cost/performance specification, judge on the basis of the fan package required to meet house air flow

needs, not just on individual fan specs (Donald, Campbell, Simpson, & Macklin, 2008).

Some growers will often cut off some fans at night to help save some energy. However, it is important that you keep your fans running; turning off some fans can result in loss of gain on birds. A study done at Mississippi State for the USDA found that a grower that runs 12 fans at night will achieve an additional \$128.70 net income after the cost to run the fan is accounted for (Dozier, Donald, Campbell, & Simpson, Big Birds, Hot Weather - and Maximum Comfort, Performance and Profit, 2006). Running the fans the extra time at night will give the birds a better environment resulting in more profits from more pounds of gain. This is most prominent with big birds; trying to save a few dollars at night on electricity is highly likely to lose the grower more in poorer feed conversion and less pounds delivered to the plant.

Broiler house lighting usually accounts for 15 to 25 percent of the annual electric bill (Simpson, Donald, Campbell, Macklin, & Burrow, Energy Efficient Lighting, 2009). It is important that growers evaluate the lights they are using and consider upgrading to more efficient ones. In April of 2008, The National Poultry Technology Center (NPTC) began a study to determine the cost reduction of Cold Cathode (CC) and Compact Fluorescent (CFL) bulb combination in commercial broiler houses. The study found that the lower power draw of CC/CFL lighting allows lighting cost savings of up to 85%, with a payback of investment as short as two flocks. Costs of the retrofit with the CC & CFL bulbs were approximately \$450,



and the average savings per flock in 2009 was \$223.50 per house. Thus, the grower sees full payback of the retrofit after approximately two flocks and the grower can expect to have longer life out of the CC & CFL bulbs as compared to incandescent (Simpson, Donald, Campbell, Macklin, & Burrow, Energy Efficient Lighting, 2009).

### ***Poultry Litter Revenues***

Poultry litter obtained from the operation is a bonus income for a grower. The litter sold from the houses can generate considerable revenues for the operation. Income from the litter can help on payments with utility bills and to pay on outstanding debt.

Goodwin et al found that “if the contract poultry producer has a cattle operation, approximately 700 tons of litter (the amount from the 4 poultry houses) with a value of \$15.00 per ton spread on pastureland would result in a value of \$10,500 per year to be credited to the total farm operation. If the producer does not have cattle, then the litter would generate considerably less revenue, in the range of \$6 to \$8 per ton, for revenues of \$4,200 to \$5,600 per ton (Goodwin, Ahrendsen, Barton, & Denton, 2005).” The litter revenues explained by Goodwin et al with litter being applied to pastures attributes value only to the nitrogen portion of the litter nutrients. The study focused on broiler production in Arkansas, Oklahoma and Missouri.

Dunkley, Cunningham and Harris (2014) found that in South Georgia, cost per ton of litter “ranged from \$10 to \$55. The study found that 27.42% of growers bought litter for \$10-\$20 per ton while 43.55% purchased litter for \$21-\$35 per ton. Just over 29% bought litter for more than \$35 per ton” (Dunkley, Cuningham, &

Harris, 2010). They spend some money on cleaning out the houses but can make a substantial amount from selling the litter. “In 2008-2009 poultry litter for crop production in Georgia sold for \$40.00 to \$60.00 per ton delivered” (Cunningham & Fairchild, 2012). Due to the contents of nutrients within the litter, crop producers can use either the litter alone or in combination with traditional fertilizers. “When Gascho et al. (2011) looked at poultry litter use in the Southern Coastal Plains based on value of a harvested crop, a ton of stack-house broiler litter added \$103.74 acre per year to the crop value” (Dunkley, Cuningham, & Harris, 2010). For farmers with dual enterprises including crop production, this will save them from buying normal fertilizer. Even if they do not utilize their own litter, they can sell it due to the nutrient contained therein, thus adding revenue to their operation.

## **Data & Methods**

### ***Step 1 - Purpose of AR. B.E.A.T***

There are a lot of useful tools for growers to utilize to learn about the financial stability of their operation; however, they fail to allow change of variables within an operation. AR B.E.A.T allows the grower/user to portray their operation in as detailed a way as possible. AR B.E.A.T has features that allow the user to enter their own house sizes if they are different than reported, revenues from litter, and labor charges. These manipulations abilities allow for the user to build the program around what their operation is like instead of using a formatted standard. Some analysis tools do not allow the user to manipulate the number and costs of the operation, which do not give the grower an accurate portrayal of his/her operation. AR B.E.A.T allows the user to enter his/her own costs that are incurred within the

operation. This gives the user a lot of flexibility to help him/her obtain a more accurate understanding of the financial status of their operation.

### ***Step 2 – Survey & Grower Contact***

I developed a survey (Figure 1) that was sent out to growers by email and post office mail. The survey was comprised of approximately eighty questions that covered the entire operation. Questions ranged from simple house and flock size, utility usage, litter revenue, labor expenses, along with house and equipment loan information. The questions were used to gather as much information about the operation as possible. After the survey questions were written and reviewed, the survey was sent to the University of Arkansas Institutional Review Board (IRB approval number 14-12-367), which approved the survey before it was sent to growers. Poultry company representatives provided contact information for growers, which was used to gather grower's information. Before growers were sent the survey they were contacted to talk about the survey and seek their participation. Growers were given all the details about the survey as well as the project. They were told about the importance of the project and how it was beneficial to them. After contact was made and growers agreed to look at the survey it was distributed. The contents of the package included the survey, IRB form for participation, and a letter discussing the implications of the overall project. The growers understood that all participation was anonymous and completely confidential. They were instructed to provide as much information as they were comfortable with and as accurate as possible.

Poultry growers in Arkansas were the primary target audience of the survey. When they returned the survey all information was entered into Excel. Excel was the chosen platform for the data collection because of the versatility of the program. The ability for running complex calculations and having multiple areas that pull numbers make excel a great platform for the program. The information from each grower is kept completely confidential. Once the information was entered and growers were identified with a number then the paper was shredded and destroyed. The information, housed within excel, is used to calculate averages of reported information for use as 'default values'. Each grower was instructed to provide as accurate information as possible and to provide numbers with which they were comfortable. For these reasons, some information is more accurate than others because it has more responses. I sent out approximately 25 surveys; 7 were returned as usable.

### ***Step 3 – Building AR B.E.A.T***

The format for the program was based off the survey that was sent to the growers. The survey questions were split up into sections based on the information they were seeking. AR B.E.A.T is comprised of two major sections that help to give the user a full understanding of the operation. Section 1 is the Assumptions Section; this is where growers input information about their operation. This section is further broken down into 4 subcategories that detail all aspects of the broiler farm. The 4 subcategories are: Initial Questions, Estimated Revenues, Estimated Expenses and Loan Information. Section 2 is the Budget Analysis Section that further breaks down into Operating Revenue, Operating Expenses, Fixed Expenses, Net Farm

Income and Net Cash Returns for the operation. Each category is broken down with individual questions to determine as much information about the operation. The questions are extremely detailed in order to learn as much about the financial side of the operation as possible.

## **AR B.E.A.T Analysis & Development**

To create AR B.E.A.T, an IRB approved survey that comprised of questions covering all aspects of a poultry operation was sent out to poultry growers in the state of Arkansas. Each question is intended to provide some piece of information to help build the analysis tool. For each area that growers answered, responses were averaged together to determine an appropriate default value. The survey was used as a platform for developing AR B.E.A.T (Figure 2).

Each question has an area where the user can input their own information about the operation or they can select a default value. Some default inputs are gathered from the collected grower surveys (Figure 3). Other default values are determined by the most recent research done in each particular field of study (Figure 4). The defaults are calculated based on information entered by the user, depending on what they input the defaults recalculate to adjust. All data collected from the growers was input into Excel. Other default data were gathered from recent research that has been completed in the respected areas. When the user is filling out the requested information they have the option of entering their own information if known or using the default values. This is exceptionally helpful for growers that do not have current information or for new-interested ones getting into the business.

Within each section breakdown there are detailed questions to gather a better understanding of the user's operation. In the first section, initial questions are asked to provide a representation of the broiler operation. Because some growers will have houses that do not fit into the standard sizes, there is an option for the user to enter additional house sizes. The house sizes, cool cells, grow out days, and number of fans is used to calculate many of the default formulas utilized throughout the program. Importantly, the feature of primary importance of AR B.E.A.T, found at the end of the program, shows the user a breakdown of cash returns and net income on both total and per square foot basis. Knowing the return per square foot can allow growers to determine the most beneficial house sizes for their income and financial stability. The income section further breaks down all the possible areas where revenue maybe generated. AR B.E.A.T is only able to give a full financial analysis of a grower's poultry operation. As the user goes through the sections to the right of each question is a link to frequently asked questions about that particular question. These are there to help clarify any confusion about a question or to help the user have a better understanding of the question.

Because the price of propane is a great concern for poultry growers, within the program I have built in a calculation to see what the user could save if they pre-purchase propane. The user can run a model both with and without pre-purchasing to see how the overall income will be affected. Propane prices are one of the greatest concerns to a grower. If they can see how the change in price will affect their operation then they will better be able to prepare for overall expenses.

### ***AR B.E.A.T Example & Walk-Through***

The following is an example calculation using the defaults of AR B.E.A.T to discover what the expected revenue, expense, and income are from a sample broiler operation. It is assumed that the grower has a 4-house farm with standard 40x400 houses in Springdale, Arkansas with millage rate of 46.5. Along with cool cells that are 4 inches, grow-out time is 42 days and there are 12 fans total. As discussed previously, each section is broken down into multiple questions to attempt to capture as much as possible about the operation.

In the assumptions section, important information about the operation is identified. The assumption section is the only section where default values cannot be selected. These questions do not have default data because they are basic questions about the operation. Questions asked are: Do you have foggers, cool cells and size, number of fans, days in grow out, and house dimensions along with total number of houses. Despite the fact that there are a few predominant house sizes, there is not a set standard house size; therefore, AR B.E.A.T allows the user to input house sizes.

The second section, estimated revenues, accounts for all possible revenues for the operation. This is almost free money to the operation. This section determines all of the flock information from number of total chicks, contract base pay, allowances from the integrator, and performance bonus. With the performance bonus the calculation will give an average, above and below average. Another revenue source is litter from the operation. Poultry litter is extremely high in certain nutrients such as nitrogen, phosphorus, and potassium, which act as great fertilizer

for forage for cattle operations. Even without cattle, it may also be beneficial to utilize the organic fertilizer on the land to grow tree and row crops (specifically cotton, soybeans, corn, peanuts, and pecans) and sell the output to other farmers. To some farmers utilizing the litter for fertilizer is easier to do just because of them already having access to the proper equipment. There is no default value for utility allowance. This is because not many integrators nowadays provide one. The main allowance is for the growers heating source such as propane or natural gas.

The third section is estimated expenses that accounts for all of the areas that a grower will spend money. This section is broken down into two further sections, variable and fixed expenses. The estimated expense section is where a grower will record all expenses of their operation. Variable expenses include expenditures for bedding, cleanout, utilities costs, maintenance cost, and on farm labor. Propane is the most costly utility for a grower. In this section, there is a question that allows growers to input the current price of propane and what they expect to pay in the future. It will show the user how much they can add to their revenue if they pre-purchase or wait. The value will show positive in the budget analysis section no matter what the user enters. If the pre-purchase value goes up from the current price, the calculation will show how much the user can save if they purchase now. If the value goes down from the current price, it will show how much the user can save if they wait to purchase. If the user does not want to use this feature they enter 0. Following the propane questions are ones addressing fixed expenses, including this house and equipment investments, insurance cost, property taxes, and land charge.



The fourth section is the loan information section, taking into account house, equipment and upgrade loan information. The user inputs all information that they know about each question. There is no default data for this section. Each category has four questions; interest rate on loan, number of years in loan, number of payments per year and amount borrowed on houses.

The fifth section is the budget analysis section that shows the user the breakdown from the inputs from the previous sections. It gives the total operating revenue from the poultry contract, litter revenue, allowances, pre-purchase propane and bonuses (\$194,847.00). Total operating expenses from bedding, utilities, repairs, maintenance, labor and miscellaneous expenses are also shown (\$56,188.00). Total fixed expenses from insurance, property taxes, land charge, depreciation, house, equipment and upgrade payment equal \$88,185.00. These three categories show the budget value and the cash value from the operation.

The final section gives the net farm income and net cash returns overall and on a per square foot basis. After running AR B.E.A.T with the default values and the assumptions previously stated, the net farm income from the operation is \$50,474, the net farm income per square foot is \$0.789, net cash returns of \$77,474 and net cash returns per square foot \$1.211. The difference between cash flow and net income of \$27,000 is comprised of depreciation costs.

## **Conclusion & Considerations**

“Individuals who are seriously considering the broiler business should learn as much as they can about broiler production by talking with other growers and integrators in their area” (Rhodes, Timmons, Nottingham, & Musser, 2011). Growers

need to study the contract and have a full understanding to make sure that they are making the right choice. A large capital investment is made to build the facilities. “An estimate for fully equipped houses currently being constructed is approximately \$13 per square foot” (Doye, Freking, Payne, & Ferrell). It is imperative that the grower truly understands the financials behind the operation. Once an individual decides to enter the life of a broiler producer, it is not an easy feat for anyone. The costs to start initially are sizeable; however, after year 16 when debt is retired, all major investment costs will have been paid and upgrades that have been made by the grower will start to yield greater net revenues for the broiler operation.

Gathering data from growers was a challenging. It was difficult to try to gain the trust growers. Once you gain their trust and you are able to build a relationship with them, growers are more willing to work with you. With me not having a lot of relationships built within the broiler side it was hard to get growers to respond to surveys that were sent. With the information that I did receive the growers were extremely helpful in providing accurate information. Not all growers provided full information from the surveys received, however they were able to provide estimates that were extremely helpful in building the program.

The two biggest variable expenses for a grower are fuel for heating and electricity from the fans and lights. Within AR B.E.A.T there is a calculation where the user can input the current price of propane and what they think it might be. This will show them how much money could potentially be saved if they were to have pre-purchase propane. Before a producer looks for alternate fuel sources it is important to really consider if the alternate source will create a return on

investment in the long run. Costs for an alternate source can be extremely costly; the grower needs to ensure that the costs will be made up with the reduction in expenditures of the alternate source. For the grower to ensure that the alternative will be profitable, they need a full understanding of the new heat source. It would be advised if the grower were to track their previous expenditures and consumption and compare with the possible new source.

It is important that growers know the financial situation of their farm operation. When working with the financials of the farm, growers often fall short of accounting for and tracking all expenditures. A grower's income varies drastically depending on the dual operations as well as their management style of the farm. With poultry alone their income relies on things ranging from their management style, ever changing utility prices to their relative performance. "It's not a grower's absolute performance that determines his pay, though; it is his relative performance" (Knoeber & Thurman, 1995).

AR B.E.A.T is an extremely useful tool for growers and other users. It is great for potential growers to gain an understanding of the potential revenue, expenses, and income to expect from the operation. Growers can also utilize the program to run "what if scenarios" to determine how changes in costs and other areas will impact the overall financials of the operation. It allows for the user to identify the variable costs of the operation and what they can do to change them. The ability to realize variable and fixed expenses will give the user a closer more accurate portrayal of their financial capacity. AR B.E.A.T is not perfect and it does have its

limitations just like other financial analysis tools. Ultimately it comes down to the growers' decisions and management of the flock.

### ***Limitations of AR B.E.A.T***

AR B.E.A.T does have its limitations in usefulness and ability to perform calculations. Currently, the program is focused on broiler production concerning growers under contract with an integrator. Also, the difficulty of gathering information from growers made the reported averages not as precise as they should be. AR B.E.A.T does not have the ability to estimate the income with dual operations, for example, broiler growers with cattle operations. This is something that will be considered with further research. Having more than one enterprise will add more diversity to the farmer's financial portfolio and help with the operations cash flow. Broiler operations for some farmers either represent a primary or supplemental income for them depending on the number of houses they have and other sources of income (Cunningham & Fairchild, 2012). Having dual operations will allow for more funding opportunities for a farmer no matter what he is going through. When a farmer has more than one enterprise it allows for them to have another source of cash flow. If one enterprise starts to slow down the farmer will have the other to supplement.

Most growers that do not have dual operations will have off farm income. "In 2008, 90 percent of all income for farm household's came from off-farm activities" (Briggeman, 2008). Off-farm income is a substantial way for families to have a constant and steady income no matter how the on farm enterprise markets fluctuate.

In future research, I would gather more responses from growers all over Arkansas and group them into big and small bird operations. This would allow more flexibility with the program. Also, there is a growing community of organic producers that would greatly benefit from the usefulness of the program and the financials presented for their operation. I would also like to incorporate easy to interpret graphs and charts that would auto format based off of the results. This would allow the user the ability to visually see the information presented and give them a better idea of actual payback periods. The current platform of the program is excel; however, in the future I would like to merge it with a program that is user friendly and ease of access. With the way that the program is built now it is like the core of an onion. There are many possibilities to keep adding onto and expanding the usefulness of the program for the user.

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Figure 1

| <b>Grower Input Information</b>  |                |             |             |
|--|----------------|-------------|-------------|
| <b>Reported information does not need to be exact if you can get as close as possible to the right numbers that is ok. If you do not have all information requested that is ok. Please provide the information that you can.</b> |                |             |             |
| <b>Initial Questions</b>   |                |             |             |
| Do you have foggers? Please circle one.  | Yes            | No          |             |
| Do you have cool cells? Please circle one.   | Yes            | No          |             |
| What are the dimensions if you have fogger?  | Thickn<br>ess: | Height:     |             |
| How many houses do you have?   |                |             |             |
| What are your house dimensions?  | Lengt<br>h:    | Width:      |             |
| What type of bird are you growing, Big or Small?   |                |             |             |
| When were your houses built?   |                |             |             |
| What is the estimated value of your poultry farm?  |                |             |             |
| What is your average down time in days?  |                |             |             |
| What type of lighting do you have in the houses?   |                |             |             |
| On average what is your length of grow out (days)?   |                |             |             |
| What county do you live in?  |                |             |             |
| What city do you live in?  |                |             |             |
| How many acres of land do your houses occupy?  |                |             |             |
| <b>Estimated Revenues</b>  | <b>2014</b>    | <b>2013</b> | <b>2012</b> |
| How many chicks per flock do you have?   |                |             |             |
| How many flocks per year do you have?  |                |             |             |
| What is your percent mortality on average?   |                |             |             |
| What is the average weight (in pounds) of your finished birds?   |                |             |             |
| What is your cents/lbs. contract base  |                |             |             |
| How many tons of litter does your farm produce annually?   |                |             |             |
| What is your sale price per ton of litter?   |                |             |             |
| What is your annual fuel allowance?  |                |             |             |
| What is your annual utility allowance?   |                |             |             |
| What are you average performance bonuses?  |                |             |             |
| <b>Estimated Expenses (These can be just an average for the year)</b>  |                |             |             |
| <b>Variable Expenses</b>   | <b>2014</b>    | <b>2013</b> | <b>2012</b> |

|   |             |             |             |
|---|-------------|-------------|-------------|
| How many annual trailer loads of bedding total for the operation? |             |             |             |
| What is the price per trailer load of bedding?                    |             |             |             |
| How many clean out loads per year?                                |             |             |             |
| What is the price per clean out load?                             |             |             |             |
| How many cake out loads per year?                                 |             |             |             |
| What is the price per cake out load?                              |             |             |             |
| How many propane gallons per year                                 |             |             |             |
| What is the price per gallon of propane?                          |             |             |             |
| How many cubic feet of natural gas are used per year?             |             |             |             |
| What is the price per foot of natural gas?                        |             |             |             |
| How many kilowatt-hours per year?                                 |             |             |             |
| What is the price per kilowatt-hour?                              |             |             |             |
| How many gallons of drinking water per year?                      |             |             |             |
| What is the price per 1,000 gallons of water?                     |             |             |             |
| What are the repair costs of the operation per year?              |             |             |             |
| What is the cleaning supplies cost per year?                      |             |             |             |
| What are the pest and rodent control costs per year?              |             |             |             |
| What is the dead bird costs per year                              |             |             |             |
| How many hours of paid farm labor per year?                       |             |             |             |
| What is the hourly wage of the paid farm labor                    |             |             |             |
| What is the total paid labor for services per year?               |             |             |             |
| What are the total miscellaneous expenses per year?               |             |             |             |
| <b>Fixed Expenses</b>   | <b>2014</b> | <b>2013</b> | <b>2012</b> |
| What is the total initial house investment?                       |             |             |             |
| What is the salvage value on the houses?                          |             |             |             |
| How many years for the house life?                                |             |             |             |
| What is the total initial house equipment investment?             |             |             |             |
| What is the salvage value on equipment?                           |             |             |             |
| How many years for the equipment life?                            |             |             |             |
| What is the total insurance cost per year?                        |             |             |             |
| What is the property cost per year?                               |             |             |             |
| What is the land charge per year?                                 |             |             |             |
| How many acres are occupied by the operation?                     |             |             |             |
| <b>Loan information</b>   |             |             |             |
| <b>Original House Loan</b>  |             |             |             |
| What is the interest rate on the house loan?                      |             |             |             |
| How many years for the house loan?                                |             |             |             |
| How many payments per year?                                       |             |             |             |
| What is the total amount borrowed on the houses?                  |             |             |             |

| <b><i>Original Equipment Loan</i></b>                |  |
|--|--|
| What is the interest rate on the equipment loan?     |  |
| How many years for the equipment loan?               |  |
| How many payments per year?                          |  |
| What is the total amount borrowed on equipment loan? |  |
| <b><i>Upgrade Equipment Loan</i></b>                 |  |
| What is the interest rate on the upgrade loan?       |  |
| How many years for the upgrade loan?                 |  |
| How many payments per year?                          |  |
| What is the total amount borrowed on upgrade loan?   |  |