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Farm-Level Financial Impacts on Contract Broiler Growers of Production Losses through Increased Out Time between Flocks

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EXECUTIVE SUMMARY

Farm-Level Financial Impacts on Contract Broiler Growers of Production Losses through Increased Out Time between Flocks

Fully understanding the financial challenges that individual contract broiler growers may be facing as a result of COVID-19 losses requires developing a farm-level assessment of sources of loss and the potential magnitude of those losses. For most contract broiler operations, the most likely source of loss seems to be a slowdown in production that results in an extension of out-time between flocks, ultimately resulting in fewer flocks delivered for the year. A reduction in flocks also results in lower variable costs so some analysis is in order to estimate the net effect on growers.

Enterprise budgets can be used to estimate the impact of production changes on net cash flow for a contract broiler operation. Incorporating variability in key production parameters (e.g., length of production cycle, stocking density, average bird weight), it is possible to compare median net cash flow results from differing average number of flocks per year and also to assess key financial risks associated with reduced flocks (e.g., probability of negative cash flow, implying inability to service debt obligations). Results of such a simulation suggest ***that the decline in median net cash flow associated with a one-flock reduction in average flocks per year is about $0.429/square foot.*** Moreover, the likelihood of experiencing negative cash flow for an operation still in repayment on their building/equipment loans increases to about 95%. ***A two-flock reduction results in losses of about $0.849/square foot and a 100% probability of negative cash flows.***

If a decline in average number of flocks is associated with changes in other key parameters that also have the effect of reducing production (e.g., lower average bird weight or lower stocking density), the negative impact on net cash flow from a reduction in flocks will be magnified. For example, the simulation model developed here is used to illustrated the ***effect of a 5% decline in stocking density as average number of flocks per year declines by one. In that case, median net cash flow declines by about $0.53/square foot.***

This evaluation does not deal with any additional costs that may be associated with flock depopulations. Of course, the extended out-times associated with depopulation events would result in costs consistent with those modeled here. Other expenses associated with cleaning/sanitizing facilities, disposing of compost, or other additional depopulation-related expenses are not captured in this analysis.

Farm-Level Financial Impacts on Contract Broiler Growers of Production Losses through Increased Out Time between Flocks

The question of the size of COVID-19-related losses for contract broiler growers has become more pressing as production slowdowns continue and the threat of further processing plant closures hangs over the market. Anderson et al. offer a preliminary estimate of aggregate losses to contract broiler growers of $162 million based on changes in production projections from USDA incorporating COVID-19 impacts and anticipated impacts as of early May 2020.[2] This macro-level approach to damage estimation is useful for understanding the scope and distribution of industry losses. It is necessary also for some important analytical applications (e.g., as a basis for economic impact analysis). However, it can also be helpful to view losses from the micro-level perspective in order to better understand the financial challenges that individual managers may be facing so as to provide effective advice and assistance in facing those challenges. In the present circumstance, developing that micro-level perspective means evaluating the magnitude of losses that may be expected at the individual farm level from changes in production resulting from COVID-19: that is, to examine and quantify the sources of individual losses to assess how the viability of an individual operation might be affected.

For most contract broiler operations, the most likely source of loss seems to be a slowdown in production that results in an extension of out-time between flocks, ultimately resulting in fewer flocks delivered for the year. Clearly, a slowdown in facility turnover like this results in fewer birds being delivered to the integrator and, therefore, less income accruing to the farm. However, it also results in lower variable costs to the operation for inputs such as electricity, fuel, and labor (noting here that several key inputs such as birds, feed, and veterinary supplies are provided by the integrator and thus affect their budget rather than the farmer's budget). Accurately assessing the impact of a production slowdown on a contract grower's financial position thus requires a relatively thorough evaluation of not only returns but also costs.

The situation is actually a bit more complicated than this, however. For most contract growers, their most significant financial commitment is the annual loan payment on the facilities and equipment that comprise the broiler operation. A farm may enjoy a positive return net of variable and fixed expenses but still experience a catastrophic financial loss due to an inability to generate revenue sufficient to cash flow the required loan payment. Therefore, the most appropriate way to evaluate financial outcomes for a broiler operation that is still within their loan repayment period (ten to fifteen years, generally, depending on specific financing arrangements) is to assess the impact of a loss in production on net cash flow. That is the exercise that is undertaken here.

Sources of Production Loss

Before directly assessing a broiler enterprise budget, it may be useful to identify some of the key production parameters affecting costs and returns in a typical broiler operation. This is best done with a simple calculation of annual Net Returns.

1) $NR = TR - TVC - TFC$,

[2] Anderson, David, J. D. Anderson, D. Brothers, J. Dorfman, K. Guidry, J. E. Holmes, J. Maples, J. Thompson, and J. Worley. "Estimate of Economic Losses by Contract Growers in the Poultry Sector due to COVID-19." University of Arkansas Department of Agricultural Economics and Agribusiness Staff Paper SP 01 2020. May 14, 2020.

where *NR* is net returns, *TR* is total returns, *TVC* is total variable costs, and *TFC* is total fixed costs.

In this general form, the equation for net returns does not offer much insight into the condition of a contract broiler grower. For that, we need to dig deeper into what constitutes revenue and variable costs for a broiler grower.

First, in most contract broiler arrangements, revenue consists of a payment rate per pound multiplied by the pounds of birds (live basis, typically) delivered to the integrator.[3] Therefore,

2) $TR = PMTR \bullet PROD$,

where *TR* is total revenue, *PMTR* is the payment rate per live pound delivered, and *PROD* is total live pounds of production. Here it becomes clear that anything affecting the quantity of live pounds delivered from the farm will directly affect the farm's total revenue. Production may be decomposed into its components as follows:

3) $PROD = FLOCKS \bullet [(SQFT/DENSITY) \bullet (1 – DL) \bullet WGT]$,

where *FLOCKS* is the number of flocks produced per year, *SQFT* is the total square feet in production, *DENSITY* is the stocking density of birds (in square feet per bird), *DL* is the percentage of birds lost to death and condemnation, and *WGT* is the average live weight of birds delivered to the integrator. Here, we can see the production factors that, along with payment rate, will influence contract grower revenue. Clearly, a reduction in delivered live weight, and a reduction in density (i.e., more square feet per bird), or a reduction in the number of flocks delivered will reduce grower revenue.

In the COVID-19 pandemic, the most common mechanism that integrators are using to reduce production is to increase the number of days between flocks for growers (out-time). With reference to equation 3, this change in out-times shows up as a smaller number of flocks.

We can use an enterprise budget to evaluate how a change in out-times reduces grower revenue as well as how that change negatively affects cash flow, which as noted earlier is probably a more relevant measure of financial viability for farms still in the repayment period on their facilities and equipment notes. Before doing that, however, one more simple budget calculation is in order.

Static Budget Analysis of Flock Losses

Note in equation 1 that *TVC* are those costs that are influenced by the level of production; that is, they increase as production increases. In contract broiler production, a good example of a variable cost is utilities. When a grower has birds, utilities are required to heat or cool the barn and to operate feeders, waterers, and lights. When the grower has no birds, those functions aren't required. Let's assume for a moment that variable costs are directly related to production such that variable costs can be represented as a fixed proportion of revenue. We'll denote that fixed proportion as α in equation 4 below, and we can now represent *NR* for contract growers as

4) $\mathrm{NR} = PMTR \bullet [FLOCKS \bullet [(SQFT/DENSITY) \bullet (1 – DL) \bullet WGT]]$

[3] Some contracts may have additional incentive payments or seasonal payments to account for higher energy costs. Similarly, in some regions, growers may receive income from the sale of litter as fertilizer. For simplicity, these more complicated revenue sources will not be examined here. Major points of this analysis are not changed by this simplifying assumption.

$$-\ \alpha\ \{PMTR \bullet [FLOCKS \bullet [(SQFT/DENSITY) \bullet (1 - DL) \bullet WGT]]\} - TFC,$$

where all variables are as previously defined.

This equation can be simplified to

5) $NR = (1 - \alpha)\{PMTR \bullet [FLOCKS \bullet [(SQFT/DENSITY) \bullet (1 - DL) \bullet WGT]]\} - TFC,$

This equation allows us to assess the impact of a change in any of the key production parameters on net returns. For example, to evaluate the impact of a change in the number of flocks received per year on net returns, one need only observe that

6) $\mathrm{d}NR/\mathrm{d}FLOCKS = (1 - \alpha)\{PMTR \bullet [(SQFT/DENSITY) \bullet (1 - DL) \bullet WGT]\}$

Solving this derivative at expected levels of the other variables provides a simple estimate of the impact of the marginal value of single broiler flock. For example, let's assume the following values for the production parameters in equation 6):

PMTR = \$0.07 per pound,
SQFT = 100,000 square feet,
DENSITY = 0.85 square feet / bird,
DL = 5.5%,
WGT = 6.5 pounds, and
α = 0.25 (i.e., *TVC* equals 25% of total revenue).

Under these assumptions, the marginal value of the broiler flock is

7) $\mathrm{d}NR/\mathrm{d}FLOCKS = (1 - 0.25)\{0.07 \bullet [(100{,}000/0.85) \bullet (1 - 0.055) \bullet 6.5]\} = \$37{,}939.$

In this example, the loss of a single flock would be expected to reduce net revenue by just under \$38,000, or about \$0.38 per square foot of production capacity.

This calculation is useful because it allows us to put a lower bound on our expectation of the marginal value of a broiler flock. In reality, *TVC* will not likely vary with production in a constant proportion. For example, differences in economies of scale across individual components of *TVC* would preclude that simplified outcome. Also, note that, conceptually, *TVC* varies with production – not necessarily with any single element that contributes to production. Thus, while some variable costs may vary directly with number of flocks, others may not. With respect to broiler production, for example, costs associated with cleaning out a house will vary with production but will not necessarily be directly proportional to the number of flocks raised: a grower will likely have to do a full clean-out for the year whether five flocks or six have been grown. The point of this is that, to the extent that some variable costs do not vary directly with number of flocks, the result in equation 7 likely underestimates the net impact of losing a flock. To derive a more realistic assessment of the marginal value of a broiler flock, a more empirical approach is necessary.

Table 1 presents a simplified enterprise budget for contract broiler production.[4] In this budget, net cash returns and net cash flow are calculated for an average annual number of flocks of 5.3, 4.3, and 3.3. As budgeted here, the loss of a single flock from the baseline of 5.3 average per year results in a reduction of net cash flow of $61,113 (i.e., from $40,192 at 5.3 flocks to ($20,921) at 4.3 flocks. This loss may be converted to a per-square-foot basis to allow at least an approximate generalization to production units of different sizes. On this basis, the loss of a flock reduces net cash flow by $0.424 per square foot. A decline in average annual number of flocks from 4.3 to 3.3 would have a similar impact on net cash flow.

Stochastic Budget Analysis of Flock Losses

The preceding exercise is a useful way to isolate the effects of a change in key production parameters (in this case, average number of flocks per year) on expected values for key financial metrics (in this case, net cash flow). However, to fully appreciate how changes in production parameters impact the financial viability of an operation, a more comprehensive and realistic evaluation of financial outcomes is in order.

Table 2 presents a more detailed enterprise budget for a hypothetical 4-house broiler operation. This budget is used to develop a stochastic simulation of key production parameters in order to evaluate changes in the distribution of net returns and net cash flow associated with variability in these parameters. Because the primary focus of the analysis remains average flocks per year, the primary variable of interest will be out-time between flocks. Specifically, for this analysis, stochastic simulation will be used to account for the correlations between key production parameters (e.g., average weight and death loss). In this simulation, out-time will be evaluated at an average of 20 days (5.3 flocks per year), 36 days (4.3 flocks per year), and 60 days (3.3 flocks per year). Returns and cash flow will be simulated for three years to compute an annual average. All key production parameters (days in production, out-time between flocks, stocking density, average weight, and death/condemnation loss) will be simulated from triangular distributions to provide a realistic level of variability within the simulated three-year horizon. Most likely values for these variables and correlations between them were obtained from a summary of broiler processing complex data for operations in the Mid-South region. Variable distributions are summarized in table 3, and correlations used in simulation are summarized in table 4.

Net Returns and net cash flow are simulated from the budget in table 1 using the parameters from tables 3 and 4. It is assumed in these simulations that the contract grower is financed at 100% on buildings and equipment and is still in the repayment period on both. It is further assumed that all labor in the operation is operator/family labor.

The distribution of net cash flow for an average of 5.3, 4.3, and 3.3 flocks per year are presented in figure 1. A few key points about these distributions are worth noting. First, in what should be considered the normal scenario of 5.3 flocks average per year, the median value for net cash flow is

[4] This budget and subsequent broiler budgets discussed in this analysis were compiled with reference to previous enterprise budgets and cash flow statements developed at Oklahoma State University and the University of Maryland. Doye, Damona, Brian Freking, Josh Payne, and Shannon Ferrell. "Broiler Production: Considerations for Potential Growers." Oklahoma Cooperative Extension Service Publication AGEC-202. May 2017. University of Maryland. Broiler Budgets, 2016. Available online at https://extension.umd.edu/lesrec/marylands-poultry/broiler-budget. Accessed on June 2, 2020.

$43,503 per year. On this four-house operation, with 5.3 flocks per year, a grower could reasonably expect to be able to meet all financing obligations, pay out-of-pocket expenses, and have about $43,500 left for other obligations and family living. In this scenario, the likelihood of experiencing negative cash flow (i.e., of leaving some payment and/or cash expense obligations unpaid) is low: actually zero given the relatively narrow distributions of production parameters used here.

By contrast, if the grower experiences extended out times such that number of flocks fall to 4.3 on average, median cash flow falls to about ($18,272). Moreover, the probability of experiencing negative cash flow increases dramatically: to around 95%. In other words, falling one flock below normal in terms of average production makes it extremely difficult for a grower who is still in the repayment period on his or her loans to meet cash flow obligations, much less contribute to family living expenses. A farm losing two flocks a year is shown to have zero chance of avoiding a negative net cash flow situation, and the median net cash flow in that situation is around ($79,000).

As in the static budget exercise, to provide some perspective on these losses, it is helpful to evaluate the change in net cash flow from the loss of a flock in terms of the loss per square foot of production space. This allows one to generalize the impact of a loss of a flock to operations of different sizes.

At the median, the change in net cash flow from 5.3 to 4.3 flocks average per year was found to be ($61,775) – that is, the ($18,272) median net cash flow from 4.3 flocks per year minus the $43,503 median net cash flow from 5.3 flocks per year. Across 144,000 square feet of production space, that is a per square foot loss of $0.429. This corresponds closely to value determined in the static budget (as it should). Using this same approach, the per square foot value of the loss of two flocks (a decline from 5.3 to 3.3 flocks per year on average) is found to be $0.849 approximately double the single-flock loss.

Note that this assessment of the marginal value of a flock assumes that as the number of flocks received per year goes down, other production parameters remain stable. To the extent that a reduction in flocks might be accompanied by other changes that would further reduce production (e.g., lower stocking density) the losses reported here would understate actual losses. In reality, an integrator wanting to reduce production may be forced to adjust several production parameters at once. Thus, it may well be the case, that as out-times increase, integrators also reduce stocking density and/or bird weight as a means of managing the shift to lower production. This would imply that the results here may be on the low side of reasonable expectations for grower losses associated with flock reductions. To illustrate, suppose that a shift from an average of 5.3 flocks per year to 4.3 flocks per year is associated with a 5% reduction in average stocking density. In that case, the median net cash flow associated with the one-flock loss would be ($32,544) – a decline of $76,047 from the average-5.3-flock median net cash flow (or about $0.53/square foot).

Table 1. Broiler Contract Grower Net Returns and Net Cash Flow at Varying Average Flocks per Year

				Flocks = 5.37		Flocks = 4.37		Flocks = 3.37
ITEM	**UNIT**	**QUANTITY**	**PRICE**	**TOTAL**	**QUANTITY**	**TOTAL**	**QUANTITY**	**TOTAL**
CASH RECEIPTS								
PAYMENTS FOR BIRDS DELIVERED	PER POUND (LIVE)	5,515,242	$ 0.0700	**$386,067**	4,474,631	**$313,224**	3,434,019	**$240,381**
VARIABLE COSTS								
VALUE OF OPERATOR/FAMILY LABOR	HOURS/HOUSE	668	$ 15.00	$ 40,068.00	590	$ 35,410.50	453	$ 27,175.50
ELECTRICITY	/SQ. FT./FLOCK	763,200	$ 0.0375	$28,620	619,200	$23,220	475,200	$17,820
FUEL	HOUSE/FLOCK	21	$ 350	$7,420	17	$6,020	13	$4,620
OTHER VARIABLE COSTS				$56,449		$51,519		$46,589
TOTAL VARIABLE COSTS				**$92,489**		**$80,759**		**$69,029**
TOTAL FIXED COSTS				**$223,905**				
TOTAL LOAN PAYMENTS (P&I)		**ANNUAL**		**$234,175**				
RETURN TO UNPAID LABOR, LAND, OVERHEAD, RISK & MGT.		**ANNUAL**		**$69,674**	**ANNUAL**	**$8,561**	**ANNUAL**	**($52,552)**
OPERATOR/FAMILY LABOR				$40,068		$35,411		$27,176
RETURN TO LAND, OVERHEAD, RISK & MGT.		**ANNUAL**		**$29,606**	**ANNUAL**	**($26,850)**	**ANNUAL**	**($79,728)**
NET CASH FLOW				**$40,192**		**($20,921)**		**($82,034)**
					NET CASH FLOW DIFFERENCE W/ 5.3 FLOCKS	**($61,113)**		**($122,226)**
					$ / SQ. FT.	**($0.424)**		**($0.849)**

Notes: These figures are for an operation consisting of 4 60' x 600' houses with the following production parameters: density, 0.85 square feet/bird; average bird live weight, 6.5 pounds; average death/condemnation loss, 5.5%. Other cash expenses include supplies, building/equipment repairs, other equipment repairs and maintenance, cleanout, and interest on operating capital. Net cash flow subtracts from Cash Receipts total variable costs, property taxes, insurance, telephone/alarm expenses, and loan payments.

Table 2. Broiler Grower Enterprise Budget: Net Returns and Net Cash Flow

	width	length	
HOUSE DIMENSIONS (feet)	60	600	
NUMBER OF HOUSES	4	BIRD DENSITY (sq. ft./bird)	0.850
AVG. BIRD SIZE (live weight, lbs.)	6.5	FLOCKS/YEAR	5.30
DEATH & CONDEM. LOSS (%)	5.5%	PAYMENT RATE ($/lb, live)	$ 0.0700
OTHER PAYMENT ($/SQ. FT.)	$ -	LITTER VALUE ($/ton)	$ -

SQUARE FEET EACH HOUSE	36,000	TOTAL SQUARE FEET	144,000
NUMBER OF BIRDS/HOUSE	42,353	NUMBEROF BIRDS/FLOCK	169,411.76
BIRDS PLACED/YEAR	897,882		

		YEAR 1		1000
ITEM	**UNIT**	**QUANTITY**	**PRICE**	**TOTAL**
CASH RECEIPTS				
PAYMENTS FOR BIRDS DELIVERED	PER POUND (LIVE)	5,515,242	$ 0.0700	**$386,067**
VARIABLE COSTS				
LABOR	HOURS/HOUSE	668	$ 15.00	$ 40,068.00
PAID LABOR	%	0%		$ -
ELECTRICITY	/SQ. FT./FLOCK	763,200	$ 0.0375	$28,620
FUEL	HOUSE/FLOCK	21	$ 350	$7,420
SUPPLIES AND MISCELLANEOUS	HOUSE/FLOCK	21	$ 675	$14,310
BUILDING & EQUIPMENT REPAIRS	HOUSE	4	$ 6,806	$27,225
OTHER EQUIP. REPAIRS & MAINT.	FARM	1	$ 2,500	$2,500
CRUST OUT/WINDROW/ CLEANOUT	/HOUSE/FLOCK	21	$ 500	$10,600
INTEREST ON OPERATING CAPITAL	%	90,675	2.0%	$1,814
TOTAL VARIABLE COSTS				**$ 92,488.50**
FIXED COSTS			TOTAL INVESTMENT	
BUILDING COST	$/HOUSE	$371,250	$ 1,485,000	houses
EQUIPMENT COST	$/HOUSE	$123,750	$ 495,000	equipment
PERCENT FINANCED	%	100%		
DEPRECIATION ON BUILDINGS	0.5	SALVAGE		$49,500.00
DEPRECIATION ON EQUIPMENT	0.25	SALVAGE		$53,035.71
DEPRECIATION ON OTHER EQUIPMENT	0.25	SALVAGE		$5,357.14
INTEREST ON BUILDINGS	15 YEARS	ANNUALLY	4.5%	$66,825
INTEREST ON EQUIPMENT	7 YEARS	ANNUALLY	5.5%	$27,225
INTEREST ON OTHER EQUIPMENT	7 YEARS	ANNUALLY	5.5%	$2,750
PROPERTY TAXES (HOUSES)	FARM	1	$ 11,664	$11,664
INSURANCE	SQ. FT.	144,000	$ 0.0420	$6,048
TELEPHONE/ALARM	FARM	1	$ 1,500	$1,500
TOTAL FIXED COSTS				**$223,905**
PRINCIPAL ON BUILDINGS				$71,449
PRINCIPAL ON EQUIPMENT				$59,877
PRINCIPAL ON OTHER EQUIPMENT				$6,048
TOTAL LOAN PAYMENTS (P&I)		**ANNUAL**		**$234,175**
RETURN TO UNPAID LABOR, LAND, OVERHEAD, RISK & MGT.		**ANNUAL**		**$69,674**
OPERATOR/FAMILY LABOR				$ 40,068.00
RETURN TO LAND, OVERHEAD, RISK & MGT.		**ANNUAL**		**$29,606**
NET CASH FLOW				**$40,191.85**

Table 3. Triangular Distribution Parameters for Broiler Production Variables

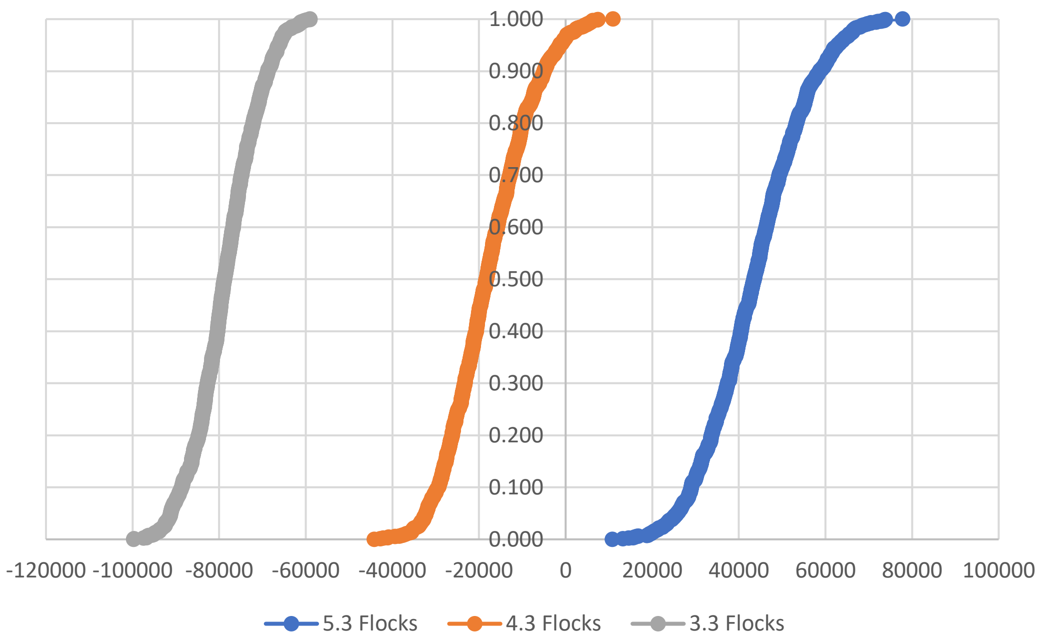
	Most Likely	Minimum	Maximum
Days in birds	48	45	52
Days out (5.3 flocks)	20	18	23
Days out (4.3 flocks)	36	32	41
Days out (3.3 flocks)	60	54	69
Stocking Density	0.85	0.80	0.90
Avg. Bird Weight	6.50	6.20	6.85
Death Loss	5.50%	3.75%	6.25%

Table 4. Correlation between Broiler Production Variables

	Days In	Density	Avg. Bird Weight	Death Loss
Days In	1.00	0.91	0.92	0.60
Density		1.00	0.96	0.63
Avg. Bird Weight			1.00	0.62
Death Loss				1.00

Notes: Spearman correlation coefficients.

Figure 1. Cumulative Distribution Function of Net Cash Flow from Contract Broiler Production under Three Scenarios for Number of Flocks per Year



Notes: Loan payments based on 100% financing of buildings for 15 years and equipment for 7 years.
All labor provided by operator and family.