DEPARTMENT OF AGRICULTURAL ECONOMICS

Contract Hog Production:

An economic evaluation

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Contract hog production involves an agreement between a contractor and a grower. The contractor owns and provides feeder pigs for feeder pig finishing contracts and breeding stock for feeder pig production contracts, and typically bears the costs associated with feed, medication, and transportation. Growers raise the pigs in their own facilities, and are compensated on a fee basis. Growers' costs typically include labor, facility costs, repairs, utilities, insurance, and property taxes.

Interest in contract hog production has increased in recent years. This growing interest in contract production is related to the risks associated with independent production, the availability of financing through contracting, and the stability of contract returns. This bulletin can be used to evaluate the profitability and feasibility of contract production.

Advantages and disadvantages

Potential contractors include investors, feed companies, and farmers. Contractors find contract arrangements attractive for several reasons. One reason for contracting may be to utilize excess feed production capacity. Contractors may also find contract production to be an effective means of reducing capital requirements and risk. Another reason for contracting hogs may be to improve the uniformity of feeder pigs or market hogs sold. Finally, a contractor may find contract production an appealing way to take advantage of the economies of size associated with buying and selling breeding stock and market hogs.

Producers enter production contracts for various reasons. One of the primary reasons is to reduce risk. Production contracts typically transfer the risks associated with changes in feed costs, breeding stock prices, feeder pig prices, and market hog prices to the contractor. The grower still bears the risk associated with owning facilities. A second reason growers enter a contract arrangement is to obtain financing for buildings and equipment. Many contractors help build the facilities and provide facility loans to growers. A third reason growers enter production contracts is to stabilize profits and cash flow per pig.

There are disadvantages to production contracts for both contractors and growers. Contractors that choose inefficient producers may lose a substantial number of hogs and money before the problem is corrected. Growers may find it difficult to save enough money from the fixed payment to build their own facilities. According to a survey by Rhodes and Grimes, 56 percent of all contract growers in 1991 indicated contract payments would not cover the costs associated with replacing facilities. Thus, the potential for contract growers to move into an independent ownership situation is limited. Another potential problem from the grower's perspective is contract length. Contract length may be substantially shorter than the time it takes to pay for facilities. If this is the case, producers need to think about how they will pay for facilities if the contract is terminated.

Evaluating hog contracts

When evaluating a contract, growers need to remember that no one contract is "best" for everyone. There are many different types of contracts. Payment method, cost sharing, and production bonuses vary from one contract to another. Whatever the contract provisions, producers and contractors should make sure that the

Table 1. Performance Measures for Swine Operations in Kansas, 1983-1992

Measure[a]	Farrow to Finish	Feeder Pig Producing	Feeder Pig Finishing
	(Per Litter)	(Per Litter)	(Per Head)
Average returns above all variable costs except labor	$287.44	$115.29	$15.63
Average returns above variable costs	$216.09	$67.26	$11.99
Average returns to labor and management[b]	$148.98	$14.47	$7.11
Average returns above total costs	$77.62	-$33.56	$3.47

Source: KSU Quarterly Swine Return Series.

[a] Variable costs include feed, labor, veterinarian costs, supplies, marketing costs, utilities, repairs, and miscellaneous costs. Fixed costs include depreciation and interest on buildings, equipment, and breeding stock.
[b] Average returns to labor and management are calculated by adding operator and hired labor to average returns above total costs.

The feasibility or affordability of contract production is another important consideration. Feasibility refers to the ability to make loan payments and pay cash expenses. One way to evaluate feasibility is to calculate the percent of the investment that can be financed with net cash flow.

Risk is an important consideration in any economic analysis of contract or independent hog production. The two major risks involved in hog production are the risks associated with investing in specialized facilities and the risks associated with fluctuating returns.

Both contract and independent hog producers face the risks associated with investing in specialized facilities. Quite often hog buildings and facilities bring less on the market than their value to the firm selling the hog buildings. Because of a relatively thin market and high transaction costs, the liquidation values for hog buildings are generally substantially lower than their replacement cost. Suter estimates that hog facilities 1 to 3 years old are worth only about 50 to 60 percent of their replacement costs. Hog facilities 3 to 5 years old are

contract rewards them for what they do best. For example, production bonuses that are too "optimistic" will not benefit even an above average producer.

Economic evaluation of hog production contracts should include an analysis of the profitability, feasibility, and riskiness of the contract. The profitability of contract production can be assessed by comparing contract returns to that of independent production. Table 1 presents several different measures of historical average returns for farrow-to-finish, feeder pig finishing, and feeder pig producing operations in Kansas. The return measures in Table 1 were computed using average levels of performance over a 10-year period. The negative return above all costs for feeder pig production indicates that this enterprise did not generate enough income to cover labor and management charges over the ten year period. At the same level of production and efficiency, contract production would be expected to generate lower returns than independent production since contract production involves a lower capital investment, less management, and less risk.

Table 2. Estimated Distribution of Returns to Labor and Management for Farrow-to-Finish Operations in Kansas from 1983-1992

Returns Per Litter	Percent of Quarters
Returns greater than $300	15.0
Returns greater than $250	22.5
Returns greater than $200	30.0
Returns greater than $150	42.5
Returns greater than $100	57.5
Returns greater than $50	80.0
Returns greater than breakeven	90.0
Returns less than breakeven	10.0
Loss greater than $50	5.0
Loss greater than $100	0.0

Source: KSU Quarterly Swine Return Series.

worth only about 35 to 50 percent of their replacement cost. When hog facilities are 6 to 10 years old, they are worth only about 20 to 30 percent of their replacement cost. Facilities older than 10 years are difficult to sell for any economic value. Suter points out that these estimates apply to areas where hog production is prevalent. Facilities located in areas where hog production is not prevalent may be worth substantially less than these estimates. For example, it is common in the Southern Plains for facilities to sit idle because a suitable buyer cannot be found.

Investment risk is the largest risk that contract hog producers face. Most contracts have a shorter duration than the useful life of the hog facilities which increases the grower's exposure to investment risk. A grower needs to factor this added risk into the decision to produce hogs under contract and needs to determine what will happen if the contract is terminated.

Contract producers do not face risks associated with fluctuations in input and output prices. Unless performance or costs change from one period to the next, contract returns are flat. The probability of returns being below a specific target is one measure of risk (Fleiser). This measure of risk focuses on the negative consequences associated with a specific action. Tables 2 through 4 present the estimated distribution of returns to labor and management for independent operations in Kansas from 1983 to 1992. For farrow-to-finish producers, returns were below breakeven during 10 percent of the quarters from 1983 to 1992. In contrast, for feeder pig finishers and feeder pig producers, returns were below breakeven for 30.0 and 52.5 percent of the quarters, respectively. Using this information, it is evident that finishing or producing feeder pigs independently is more risky than independent farrow-to-finish production since the probability of returns being below breakeven is higher for these two modes of production.

Two things should be noted when using the information in Tables 1 through 4. First, returns above total costs are typically higher for farrow-to-finish producers. Second, downside risk is greater for feeder pig finishers and feeder pig producers than it is for farrow-to-finish producers. Thus, contract production is more attractive to producers who want to finish hogs or produce feeder pigs than it is to farrow-to-finish operators. This helps explain why contract hog finishing and feeder pig production are more common than contract farrow-to-finish production.

Feeder pig finishing contracts

Hog finishing contracts are more prevalent than contracts for feeder pig and farrow-to-finish production. Survey results from Rhodes and Grimes indicate that all large contractors (over 50,000 head contracted)

Table 3. Estimated Distribution of Returns to Labor and Management for Feeder Pig Producing Operations in Kansas from 1983-1992

Returns Per Litter	Percent of Quarters
Returns greater than $200	0.0
Returns greater than $150	10.0
Returns greater than $100	22.5
Returns greater than $50	35.0
Returns greater than breakeven	47.5
Returns less than breakeven	52.5
Loss greater than $50	22.5
Loss greater than $100	5.0

Source: KSU Quarterly Swine Return Series.

Table 4. Estimated Distribution of Returns to Labor and Management for Feeder Pig Finishing Operations in Kansas from 1983-1992

Returns Per Head	Percent of Quarters
Returns greater than $30	5.0
Returns greater than $25	10.0
Returns greater than $20	10.0
Returns greater than $15	20.0
Returns greater than $10	35.0
Returns greater than $5	57.5
Returns greater than breakeven	70.0
Returns less than breakeven	30.0
Loss greater than $5	15.0
Loss greater than $10	2.5

Source: KSU Quarterly Swine Return Series.

have pig finishing contracts. Many hog finishing contracts guarantee a producer a fixed payment, and add or subtract bonuses and penalties from this payment. Bonuses are typically paid for keeping death losses low and feed efficiency high. Penalties are sometimes imposed for high death losses and unmarketable animals.

Table 5 is a worksheet that can be used to calculate the costs and returns per head for contract hog finishing. Variable costs include utilities, fuel, oil, hired labor, and miscellaneous costs such as dues in professional organizations, vehicle expenses, minor repairs, and interest on variable costs. Fixed costs include depreciation and interest on buildings and equipment, insurance, and property taxes. Fixed costs are typically 12 to 18 percent of investment costs per head.

In the example presented in Table 5, the grower is responsible for facility costs, labor, utilities, fuel, oil, repairs, insurance, and property taxes. The figures for utilities, fuel, oil, insurance, and property taxes are obtained using average costs for hog finishers in the Kansas Farm Management Associations. A repair cost of $1.00 per pig is included in the example. As buildings and equipment become older repair costs increase. Repairs and supplies for hog finishers in the Kansas Farm Management Associations averaged $2.39 per head in 1991. Depreciation and interest are based on a building cost of $64.50 per pig, an equipment cost of $94.00 per pig, and an interest rate of 9 percent. Buildings are assumed to have a useful life of 20 years and equipment is assumed to have a useful life of 10 years. The calculations in the example assume that a grower will get 2.75 turns per year out of the facilities.

Contract payments can be per head, per pound of gain, per day, or per pig space. The payment used in the example in Table 5 is $12 per head. Payments on a per-head basis typically range from $9 to $12 per head. Typically about one-half of the payment is received at the time of feeder pig arrival and the other one-half is received at market time. Payments on a per- pound-of-gain basis typically range from $0.05 to $0.06. Payments on a per- day basis typically range from $0.07 to $0.10 per head. Payments on a per-pig-space basis typically range from $30 to $40 per pig space per year. Under this contract, a grower receives a fixed fee regardless of how many pigs are fed. Payments based on a per pig space basis are attractive from the grower's perspective because, under this contract, less than fully utilized facilities will not add to fixed costs per head.

The example in Table 5 does not include bonuses or penalties. Bonuses are commonly paid if feed conversion and death loss are lower than a pre-arranged stan-

Table 5. Contract Feeder Pig Finishing Worksheet

	Example	Your Farm
A. Variable Costs Per Head		
1. Utilities, Fuel, and Oil	$1.75	_____
2. Hired Labor	0.00	_____
3. Miscellaneous Costs	1.50	_____
4. Total Variable Costs (1+2+3)	$3.25	_____
B. Fixed Costs Per Head		
5. Depreciation on Buildings and Equipment[a]	$4.60	_____
6. Interest on Buildings and Equipment[b]	2.60	_____
7. Insurance and Property Taxes	0.50	_____
8. Total Fixed Costs (5+6+7)	$7.70	_____
C. Total Costs Per Head (4+8)	$10.95	_____
D. Gross Return Per Head[c]		
9. Base Payment	$12.00	_____
10. Feed Efficiency Bonus	0.00	_____
11. Death Loss Bonus or Penalty	0.00	_____
12. Total Compensation Per Head (9+10+11)	$12.00	_____
E. Return to Operator Labor and Management (D-C)	$1.05	_____

[a] Depreciation is calculated as follows: $(($64.50 \div 20) + ($94.00 \div 10)) \div 2.75$.
[b] Interest is calculated as follows: $(($64.50 + $94.00) \div 2.75) \times 9\% \times 0.5$.
[c] Bonuses and penalties should be spread over the number of head marketed.

dard. Penalties may be incurred if death loss is higher than a pre-arranged standard. Information on expected production efficiency is needed to evaluate the expected level of bonuses and penalties. In the 1992 Iowa State Swine Enterprise Systems, average feed conversion was 3.40 pounds of feed per pound of pork produced. Average death loss was 3.05 percent. Some producers are able to attain animal performance better than the averages. Producers in the top one-third profitability group had average feed conversions of 3.24 pounds and average death losses of 3.06 percent.

The estimated return to operator labor and management for the example in Table 5 is $1.05 per head. The expected return generated from contract production should be compared to expected returns that could be obtained from independent production. Potential contract payments are typically lower than potential returns from independent production. However, risk is also lower for contract production. The contract producer must decide whether the stability in returns associated with contract finishing is worth the sacrifice in the level of expected returns.

Another economic aspect that needs to be considered is feasibility. Cash flow available for principal and interest payments can be calculated by subtracting variable costs, insurance, and taxes from gross returns. Cash flow available for principal and interest payments for the example in Table 5 is $8.25. If 100 percent of the investment is financed using a 9 percent interest rate and a 10-year loan, annual principal and interest payments would be $9.00 per head. Thus, in this example, if the grower finances 100 percent of the investment, the net cash flow will be a negative $0.75 per head. The grower either needs to find some other source of income to cover the deficit in cash flow or finance less than 100 percent of the investment. The

grower can afford to finance about 92 percent of the investment in this example and still cover cash costs, and principal and interest payments.

Feeder pig producing contracts

According to the survey results by Rhodes and Grimes, 71 percent of large contractors (over 50,000 head contracted) have feeder pig producing contracts. Similar to hog finishing contracts, feeder pig production contracts typically guarantee a producer a fixed payment and add or subtract premiums and discounts from this payment.

Table 6 is a worksheet that can be used to calculate the costs and returns per litter for contract feeder pig production. Variable costs include utilities, fuel, oil, hired labor, and miscellaneous costs such as dues for

Table 6. Contract Feeder Pig Production Worksheet

	Example	Your Farm
A. Variable Costs Per Litter		
1. Utilities, Fuel, and Oil	$22.25	_____
2. Hired Labor	0.00	_____
3. Miscellaneous Costs	13.50	_____
4. Total Variable Costs (1+2+3)	$35.75	_____
B. Fixed Costs Per Litter		
5. Depreciation on Buildings and Equipment[a]	$42.75	_____
6. Interest on Buildings and Equipment[b]	25.65	_____
7. Insurance and Property Taxes	5.50	_____
8. Total Fixed Costs (5+6+7)	$73.90	_____
C. Total Costs Per Litter (4+8)	$109.65	_____
D. Number of Feeder Pigs Produced Per Litter	8.40	_____
E. Gross Return Per Litter[c]		
9. Base Payment ($/Head x D)	$168.00	_____
10. Feed Efficiency Bonus	0.00	_____
11. Death Loss Bonus or Penalty	0.00	_____
12. Gross Return Per Litter (9+10+11)	$168.00	_____
F. Return to Operator Labor and Management (E - C)	$58.35	_____
G. Return Per Head Produced (F ÷ D)	$6.95	_____

[a] Depreciation is calculated as follows: ($285 ÷ 20) + ($285 ÷ 10).
[b] Interest is calculated as follows: ($285+$285) x 9% x 0.5.
[c] Premiums and discounts should be spread over the number litters produced.

professional organizations, vehicle expenses, minor repairs, and interest on other variable costs. Fixed costs include depreciation and interest on buildings and equipment, insurance, and property taxes. Fixed costs per litter are typically about 12 to 18 percent of investment costs.

The grower is responsible for facility costs, labor, utilities, fuel, oil, repairs, insurance, and property taxes in the example in Table 6. The figures for utilities, fuel, oil, insurance, and property taxes are obtained using average costs for feeder pig producers in the Kansas Farm Management Associations. Repair costs of $10.00 per litter are included in the example. Repair costs increase as the facilities age. Repairs and supplies averaged $30.31 per litter for feeder pig producers in the Kansas Farm Management Associations in 1991. Depreciation and interest are based on a building cost of $285 per litter, an equipment cost of $285 per litter, and an interest rate of 9 percent. Buildings are assumed to have a useful life of 20 years and equipment is assumed to have a useful life of 10 years. The calculations in the example assume that a grower will get two litters from each sow per year.

Contract payments are typically on a per head basis. The payment used in the example in Table 6 is $20 per head. The example in Table 6 does not include any premiums or discounts. Premiums and discounts may apply to one or more of the following items: pigs saved, pigs weaned per litter, pigs weaned per female per year, average weight of more than 40 pounds, sow death loss, feed efficiency, and percent of crates filled. Information on expected production efficiency is needed to evaluate the expected level of premiums and discounts. In the 1992 Iowa State Swine Enterprise Systems, the average feed conversion was 4.05 pounds of feed per pound of pork produced. The average number of pigs weaned per litter was 8.65 pigs. The average number of pigs weaned per female per year was 17.07 pigs. Breeding stock death loss averaged 4.93 percent. Some producers are able to attain animal performance better than the averages. Producers in the top one-third profitability group had average feed conversions of 3.61 pounds and average breeding stock death losses of 3.69 percent. The average number of pigs weaned per litter was 9.06 pigs for producers in the top one-third. Pigs weaned per female per year averaged 19.19 pigs for this group.

The estimated return per litter for the example in Table 6 was $58.35. The expected return generated from contract production should be compared to expected returns that could be obtained from independent production. Contract payments and financial risk are typically lower than that of independent producers. The contract producer must decide whether the stability in returns associated with contract feeder pig production is worth the sacrifice in the level of expected returns.

Another economic aspect that needs to be considered is feasibility. Cash flow available for principal and interest payments can be calculated by subtracting variable costs, insurance, and taxes from gross returns. Cash flow available for principal and interest payments for the example in Table 6 is $126.75 per litter. If 100 percent of the investment is financed using a 9 percent interest rate and a 10-year loan, annual principal and interest payments would be $88.80 per litter. Thus, in this example, the grower can finance 100 percent of the facilities and still generate a positive net cash flow of $37.95 per litter.

Characteristics of a good contract

Before considering the details of a contract, both parties should investigate the reputation of the other party involved in the contract. Some contracts cannot be terminated easily, so it is important to get this information before discussing a contract. Also, the advice of a lawyer or other expert may be useful in evaluating contract provisions. Contract provisions should include (McDaniel et al.):

- The name of both parties;
- The rights and responsibilities of each party;
- The number of pigs involved;
- The duration of the contract;
- The method and timing of payment;
- The timing of delivery of hogs;
- The costs to be paid by each party;
- The brands of feed and supplement fed;
- A clear statement of how bonuses and discounts will be handled;
- A clear description of how health problems will be handled;
- The methods used to calculate performance guidelines; and
- How and when either party can terminate the contract.

The contract should also include a section on health care and a description of how weights will be determined. Delivery of unhealthy hogs would make it difficult to earn bonuses. A contract clause could be included that specifies the source of the pigs and the distance of that source from the grower. Some contracts do not specify how the weights and performance of the pigs are determined. A contract provision suggesting that the contractor provide information on the weight of the pigs entering the facilities, sale weight, feed fed, and how performance is computed would be advantageous to the grower.

Conclusions

Interest in contract hog production is increasing. Contractors are looking for an effective means to expand production or utilize excess feed production capacity. Growers enter contracts to minimize input and market price risks, or to obtain financing for buildings and equipment.

Expected returns from contract production are lower than the historical average returns obtained by independent producers. However, downside risk is also of less concern to contract producers. Thus, a grower considering contract production must decide whether the stability of contract returns is worth the sacrifice in the level of expected returns.

Producers deciding whether to produce hogs under contract should calculate expected contract returns for a range of production and cost scenarios. Whatever the contract provisions, growers and contractors should make sure that the contract rewards them for what they do best.

Acknowledgments

References

Fleiser, B. *Agricultural Risk Management*, Boulder, Colorado: Lynne Reiner Publishers, 1990.

McDaniel, J.S., M. Hayenga, E. Mobley, and V.J. Rhodes. "Producing and Marketing Hogs Under Contract," PIH-6, *Pork Industry Handbook*, Cooperative Extension Service, Kansas State University, June 1988.

Rhodes, V.J. and G. Grimes. "U.S. Contract Production of Hogs: A 1992 Survey," University of Missouri, Agricultural Economics Research Report No. 1992-2.

Suter, R.C. *The Appraisal of Farm Real Estate*, Third Edition. Danville, Illinois: The Interstate Printers & Publishers, 1989.