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Attitudes and Characteristics of U.S. Hog Producers Under Alternative Business Arrangements

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Abstract

This study compares four business arrangements using variables such as farm characteristics, producer attitudes, farm financial, and producer characteristics. Data were obtained from a national survey of hog farmers conducted during the summer and fall of 2000. Results reveal that these factors differ significantly among business arrangements.

Introduction

The structure of the U.S. hog sector has changed greatly in recent years. As hog farm numbers have decreased, the percentage of farmers producing under contract has increased. According to Rhodes and Grimes (1992), approximately 10 percent of U.S. produced hogs were raised under contract in 1989. By 1997, Lawrence (1998) and Meyer (1998) estimated the number of hogs produced under contract to be between 20 and 30 percent. Smithfield Foods, Murphy Farms, Prestage Farms, and others are among those companies that contract with hog producers. In many cases, contract production has allowed producers to establish large-scale hog units with lower initial capital investment requirements. In the hog industry, contract farming generally refers to the situation where the contractor owns the hogs, feed, and sometimes the processing sector, while the hog farmer owns a separate firm that raises contractor-owned hogs to market weight.



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In spite of the increased number of contract producers over the last decade, the majority of the U.S. hog farm population remains independent. Similar to contract production, significant changes are occurring among independent producers. Formation of marketing and/or input-providing cooperatives have been considered by some independent producers as an alternative to contract farming. Such cooperatives provide opportunity for producers to benefit from many of the advantages of contract production while allowing them to maintain autonomy, as discussed by Gillespie and Eidman (1998). Several studies have examined different cooperatives and how they have been structured to compete in an industry that is increasingly characterized by greater economies of size and increased contracting (e.g., Fulton and Gillespie, 1995; Grey, 2000). Considering these changes in the structure of the industry, it is of interest to examine the types of farmers that are producing under each of the different business arrangements.

The evolution of the U.S. hog industry has captured the interest of a number of researchers in recent years. Previous studies comparing independent and contract producers include Rhodes and Grimes (1992), Lawrence, Grimes and Hayenga (1998), and Lawrence and Grimes (2001). Our study differs from these studies in that it compares four alternative business arrangements. The previous studies concentrate more on farm size, contract relations, and marketing agreements, while the present study compares farm characteristics, financial characteristics, risk attitudes, autonomy preferences, social capital considerations, and socioeconomic characteristics.

Data and Methodology

A national survey was conducted during the summer and fall of 2000 to provide data for this study. 4,986 surveys were mailed to U.S. hog producers. The producers surveyed were taken from a random sample of National Hog Farmer magazine subscribers. A stratified sample of U.S. hog producers was used; 831 producers were surveyed in each of the following hog inventory categories: 200-999 hogs, 1,000-1,999 hogs, 2,000-2,999 hogs, 3,000-4,999 hogs, 5,000-9,999 hogs, and 10,000 hogs and over. Using Dillman (1978) as a guide, an initial mailing of the survey was followed by a postcard reminder two weeks later. After the postcard reminder was mailed, a second mailing of the survey was sent during the

second week of September, 2000. A total of 1,031 completed surveys were returned.

Producers were asked to characterize their farms, socioeconomic status, and financial characteristics. All questions asked them to report 1999 statistics. The first set of questions examined business structure, farm size, diversification, and technologies used in the operations. One question asked producers to categorize themselves as either independent, cooperative, flat-fee contract, tournament contract, incentive payment contract, or vertically integrated producers, all of which are defined as they were in the survey in Table 1. Specific questions dealt with the number of finished hogs raised to 200-300 pounds for market, the number of breeding sows in the operation, the number of pigs raised to a weight of 40-60 pounds for market, and the other enterprises on the producer's farm. Producers were asked how long they had been raising hogs, how many acres of land were used to support their hog operations, how often hogs were sold, how many hours per week they worked in an off-farm job, and how many full-time and part-time employees worked on the farm.

Table 1. A Description of the Business Arrangements Analyzed

Business Arrangement	Description
Independent Production (ID)	All inputs involved in the production process are owned and managed by the producer. The producer incurs all risk and transaction costs through the production and marketing of hogs.
Cooperative Farming (C)	A jointly owned farm enterprise consisting of two or more farmers who aggregate their resources and expertise to finance, produce and/or market hogs.
Flat-fee Contract (FC)	This contract include a fixed payments. The producer is paid a guaranteed piece-rate payment for his/her services, and at the end of the grow-out period, the contractor reclaims the hogs.
Incentive Payment Contract (IC)	The contractor provides the producer with inputs such as feeder pigs, feed, veterinary services and medication, while the producer supplies the labor, utilities, buildings, and fuel. This contract includes an incentive-based payment that is rewarded on the basis of feed efficiency, minimum mortality, length of time in grow-out or the performance of other producers who have similar contractual agreements.
Tournament Contract	This agreement is similar to the previous contract in terms of input supplied and incentive criteria however, this contract differs in the number of farmers competing for incentive payments, which varies with performance.
Vertical Integration	A firm that owns up-and downstream firms and supplies all inputs for the production of hogs and employs producers at a wage to manage the unit.

Three financial questions were asked, dealing with the farmer's debt-to-asset ratio, the value of their total farm assets including land value, and their total net household income. A question was asked to elicit producers' preferences for autonomy. Producers were asked, "How important is it to you to have complete control over all production, marketing, and management decisions in your hog operation?" Four potential categorical answers were: "not important at all," "not very important," "somewhat important," and "very important."

The importance of social capital to producers was elicited. Producers were asked how important were their relationships with lending institutions, feed merchants, and packer and slaughter houses. Potential answers to these questions included: "not important at all," "not very important," "somewhat important," and "very important." Questions dealing with producer demographics were asked, such as age and level of educational attainment.

To determine whether there were significant differences in these variables across business arrangements, Wilcoxon's rank sum test was used. It is appropriate for comparing two populations in the presence of non-normality when working with two independent samples. For more details on Wilcoxon's Rank Sum Test, see Ott (1988).

Results

Of the 1,031 completed surveys, 684 were from independent producers, while 66, 81, 118, 21, and 61 were from cooperative, flat-fee, incentive payment/tournament, vertical integration and other producers, respectively. Tournament contracts and incentive payment contracts are combined in this analysis due to similar characteristics, while vertically integrated operations and other types of business arrangements are excluded. Reasons for their exclusion are the lack of sufficient observations and the lack of clearly defined business arrangements. For each variable, a Wilcoxon Two-Sample Test was conducted for two populations to determine if the mean scores for all business arrangement combinations were equal. The hypothesis that the mean scores for each business arrangement combination are equal was tested at the 5 percent level.

Farm Characteristics

Descriptive results of the farm characteristics are presented in Table 2, and results of the Wilcoxon two sample tests are presented in Table 5. The average number of finished hogs sold per farm in 1999 was higher for incentive payment contract producers than for flat-fee contract or independent producers. Both flat-fee contract producers and cooperative producers raised more finishers, on average, than did independent producers. The picture was different when examining numbers of breeding sows on operations. Cooperative producers had more breeding sows per farm than did incentive payment contract, independent, or flat-fee contract producers. Independent and incentive payment contract producers had more sows per farm than did flat-fee contract producers. These results show incentive payment producers to be more concentrated in finishing, while many cooperative members concentrated on both farrowing and finishing. The number of feeder pigs raised for sale did not differ significantly across the business arrangements.

Table 2. Farm Characteristics of Hog Producers Under Different Business Arrangements: Means

Variable	Independent Production	Cooperative Member	Flat-fee Contract	Incentive Payment Contract
<i>Farm / Locational Characteristics</i>				
Number of Hogs Raised to 250 Pounds	2,511	7,795	3,805	10,742
Number of Breeding Sows	262	748	49	297
Number of Pigs Raised to 50 Pounds	354	1,323	2179	2174
Number of Other Enterprises on the Farm	3.33	2.78	2.56	2.92
Years the Producer Has Raised Hogs	27	21	18	19
Acres of Land Supporting the Hog Operation	609	768	448	463
Percentage of Producers Raising Corn	87	71	79	65
Percentage of Producers Raising Soybeans	81	69	74	65
Percentage of Farm Is Located in the South	2	1	13	31
Number of Hours per Week Worked Off-Farm	8.89	10.53	16.02	12.06
Number of Full-Time Employees on Farm	1.36	3.35	0.74	1.64
Number of Part-Time Employees on Farm	0.81	1.13	0.41	0.66

Independent producers had more diversified operations than did contract producers. The lower diversification level of the contract producers is likely a response to their larger hog operation sizes and the price risk-reduction benefits of some contracts.

Independent producers had been raising hogs longer than producers under other business arrangements and cooperative producers had raised hogs longer than flat-fee contract producers.. This is likely the result of newer producers' greater needs for access to capital and the lesser initial capital requirements associated with contract production.

Table 5. Comparison of Wilcoxon Mean Scores among Business Arrangements

Variable	Indep vs. Coop	Indep vs. Flat Fee Contract	Indep vs. Incentive Contract	Coop vs. Flat Fee Contract	Coop vs. Incentive Contract	Flat-Fee vs Incent Contract
No. of Finisher Hogs Raised	-	-	-	ns	ns	-
No. of Breeding Sows	-	+	ns	+	+	-
No. of Feeder Pigs Raised	ns	ns	ns	ns	ns	ns
No. of Other Enterprises	ns	+	+	ns	ns	ns
Years Producer Raised Hogs	+	+	+	+	ns	ns
Acres Supporting the Hog Operation	-	+	+	ns	+	ns
% Producers Raising Corn	+	ns	+	ns	ns	ns
% Producers Raising Soybeans	+	ns	+	ns	ns	+
Farm Is Located in South	ns	ns	-	ns	ns	ns
Hrs/Wk Worked Off-Farm	ns	-	ns	ns	ns	ns
No. Full-Time Employees	-	ns	ns	+	+	ns
No. Part-Time Employees	-	ns	ns	+	ns	ns
Debt:Asset Ratio	-	-	-	ns	ns	ns
Value of Farm Assets	-	+	ns	+	+	ns
Net Household Income	-	+	-	+	ns	-
Autonomy Not Imp. at All	-	-	-	-	-	ns
Autonomy Very Important	+	+	+	+	ns	ns
Imp of Social Relations Lending Institutions	-	ns	-	ns	ns	ns
Imp of Social Relations Feed Merchants	ns	+	+	+	+	ns
Imp of Social Relations Packers	ns	+	+	+	+	ns
Producer's Age	+	+	ns	ns	ns	-
Prod. Compl. High School	ns	ns	ns	ns	ns	-
Prod. Compl. Bach. Degree	-	ns	+	+	+	ns

+ signifies the first listed business arrangement is greater than the second at $\alpha=0.05$.
 - signifies the second listed business arrangement is greater than the first at $\alpha=0.05$.
 ns signifies the difference between the two business arrangements was non-significant.

Cooperative producers, on average, used more acres for their hog operations than did independent and incentive payment contract producers. Independent producers used more land for their operations than did contract producers. This result is consistent with the greater diversification of independent relative to contract producers.

More independent producers raised corn or soybeans than did cooperative or incentive payment contract producers. Flat-fee contract producers raised more soybeans than did incentive payment contract producers. Much independent hog production has been historically vertically integrated with grain production and on-farm feed milling, while contract producers generally obtain feed through the contractor.

A higher percentage of incentive payment contract than independent producers were from one of the Southern states (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi,

North Carolina, South Carolina, Tennessee, Texas, or Virginia). Much of the industry's expansion in recent years has been in the South, notably North Carolina.

Flat-fee contract producers worked more hours, on average, off-farm than did independent producers. The average number of full-time workers employed per hog farm was higher for cooperative than for other hog farms. Cooperative hog farms employed over twice as many full-time workers as incentive payment contract producers, and nearly three and over four times as many as flat-fee contract and independent producers, respectively. The average number of part-time workers employed also was higher among cooperative producers, though not significantly greater than incentive payment contract producers. Overall, independent and cooperative producers worked fewer hours off farm and/or hired more employees than did contract producers. This is consistent with the relatively high production of hogs among cooperative producers, the more highly diversified nature of the independent farms, and the reduced management responsibilities associated with contract production (due to shared management with the contractor).

Financial Characteristics

Three financial measures were of interest (Table 3). Independent producers had lower debt-to-asset ratios than did other producers. Though one might initially expect independent producers to hold greater debt since they must own all factors of production, the larger sizes and younger ages of contract producers in the survey likely explain the difference in debt-to-asset ratio. On the other hand, cooperative producers had a higher value of total farm assets than did other producers. Flat-fee contract producers had the overall lowest levels of farm assets among the group. Cooperative and incentive payment contract producers had the higher net household incomes in the sample.

Producer Attitudes and Characteristics

Results of producer attitude questions are shown in Table 4. When producers were asked how important it was to have complete control over all production, marketing, and management decisions in their hog operations, a higher percentage of flat-fee and incentive payment contract producers

Table 3. Financial Characteristics of Hog Producers Under Different Business Arrangements

Variable	Independent Production	Cooperative Member	Flat-fee Contract	Incentive Payment Contract
	Percent			
Debt-Asset Ratio				
No Debt	28.3	12.9	10.2	11.6
1 to 20%	21.5	20.3	20.5	23.3
20 to 40%	27.6	27.7	24.3	22.3
40 to 60%	16.9	31.4	25.6	29.1
61% or Greater	5.5	7.4	19.2	13.6
Total Value of Farm Assets				
\$0 - \$499,999	25.5	18	33.3	31
\$500,000 to \$999,999	30.8	19.6	29.4	33.9
\$1,000,000 to \$1,499,999	17.5	9.8	12.8	17.4
\$1,500,000 to \$1,999,999	7.5	13.1	10.2	11.6
\$2,000,000 to \$2,499,999	6.6	4.9	6.4	5.8
> \$2,500,000	11.9	34.4	7.6	11.6
Net Household Income				
\$19,999 or Less	13.3	3.3	8	7.4
\$20,000 to 39,999	30.1	23.3	40	22.4
\$40,000 to 59,999	26.2	31.6	29.3	20.5
\$60,000 to 79,999	11.3	20	10.6	17.7
\$80,000 to 99,999	7	6.6	5.3	14
\$100,000 to 199,999	7.5	6.6	5.3	15.8
\$200,000 or More	3.9	8.3	1.3	1.8

Table 4. Attitudes and Characteristics of Hog Producers Under Different Business Arrangements

Variable	Independent Production	Cooperative Member	Flat-fee Contract	Incentive Payment Contract
	Percentage			
How Important Is It for You to Have Complete Control Over All Production, Marketing, and Management Decisions in Your Hog Operation?				
Not Important at All	1.9	7.4	24.4	21.2
Not Very Important	2.4	11.8	15.9	14.4
Somewhat Important	24.9	44.1	40.2	37.3
Very Important	68.7	32.4	15.9	25.4
With Respect to Your Social Relationships and Farm Operation, How Important Are Each of the Following Relations?				
Lending Institutions				
Not Important at All	4.3	0	3.7	1.8
Not Very Important	6.4	6	7.5	3.1
Somewhat Important	30.7	19.6	29.1	22.4
Very Important	58.4	74.2	59.4	72.3
Feed Merchants				
Not Important at All	3.4	0	7.6	12.5
Not Very Important	8.6	6	15.3	7.1
Somewhat Important	48.8	53	53.8	46.2
Very Important	39.1	40.9	23	34
Packers and Slaughterers				
Not Important at All	4.3	0	18.9	23
Not Very Important	10.8	10.6	21.5	14
Somewhat Important	40.6	36.3	34.1	32
Very Important	44	53	25.3	31
Average Farmer Age				
	48	43	43	47
Farmer's Education				
Less than High School	4.4	2.9	4.9	6.8
Completed High School	33.3	25	25.6	37.3
Some Coll. or Tech School	35.4	30.9	46.3	33.9
Bachelor's Degree	21.8	30.9	20.7	17.8
Master's Degree	3.2	4.4	2.4	3.4
Doctoral Degree (highest level)	1.5	1.5	0	0.8

answered "not important" than did other producers. A higher percentage of cooperative producers answered "not important" than did independent producers. The percentage of producers who answered "very important" was highest among independent producers. Cooperative producers were more likely to answer "very important" than were flat-fee contract producers. Thus, as expected, those with less concern over control of their operations were those who likely held less control.

Cooperative and incentive payment contract producers rated relationships with lending institutions as more important than did independent producers. This is consistent with their higher debt-to-asset ratios. Cooperative and independent producers felt that relationships with both feed merchants and packers were more important than did contract producers. This is likely due to the market relationship between independent producers and these firms.

Independent producers were older than cooperative and flat-fee contract producers. Incentive payment contract producers were older than were flat-fee contract producers. More incentive payment contract producers completed high school than did flat-fee contract producers. On the other hand, a higher percentage of cooperative producers completed a Bachelor's degree than did producers under any other business arrangement, and a higher percentage of independent producers had completed college than had incentive payment contract producers. Thus, cooperative and independent producers were the more highly educated. This likely reflects the greater management responsibilities required with managing independent and most cooperative operations.

Conclusions

This study shows the relationship between business arrangement choice and farm characteristics, producer attitudes, farm financial, and producer characteristics. Results reveal that these factors differ significantly among business arrangements. The usefulness of these results is far-reaching and may be of greatest interest to farm managers, university researchers, and policymakers.

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