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Grain Producers' Attitudes to New Forms of Supply Chain Coordination

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ABSTRACT: This paper reports the analysis of two groups of wheat producers: American White Wheat Producers Association members who produce white wheat under contract with the cooperative and those who have chosen not to do so. The results show the diversity of producers' attitudes, preferences, knowledge and decision making. Nonmembers tend to rely more on short-term profitability and are less willing to risk innovation for unproven profits. Nonmembers also are less supportive of contract production and less inclined to use a young cooperative in that situation. This study demonstrates that the development of a new coordination mechanism entails much education of participants and that producer involvement also depends on learning on the part of everyone in the supply chain.

Agriculture is in a period of major technological and institutional changes. Technological change is not new to agriculture, but institutional change is. The major ongoing institutional change has been the adoption of new forms of vertical coordination to replace the traditional commodity marketing system (King, 1997). Two factors are driving this change. First, agriculture has become more demand oriented, and the Federal Agricultural Improvement and Reform Act of 1996 (FAIR Act) is moving agriculture farther and faster along that road. Second, recognition of the benefits of supply chain management has resulted in fundamental changes in the organization of and coordination within some agricultural industries.

Supply chain management is the direct management and coordination of all activity levels that make up a supply chain, even though activities at different levels may be owned by different entities (Robeson and Copacino, 1994). In food and

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agriculture, the supply chain starts with the final consumer and reaches back to the farm. Substitution at the producer-processor level of other forms of vertical coordination for the traditional commodity market is common in the poultry industry and is used increasingly in the pork industry.

Although the traditional commodity market remains dominant in the grains industry, technological developments are adding pressure for increased reliance on other forms of coordination. Specialty grains, for example, may be passed from the producer to the processor using something other than the traditional commodity market, and the occurrence of specialty or identity-preserved grains is expected to continue to grow. Unlike earlier varietal research, plant genetic research is designed increasingly to yield crops with special characteristics that add further processing value as these characteristics improve the quality of the final product (Kansas Agricultural Experiment Station, 1991). Thus, supply chain management can be used to improve quality in the lowest possible cost environment.

Additionally, supply chain management can be used to capture monopoly profits, such as those associated with new genetics. If the genetics are protected only under the Plant Variety Protection Act, the producer is not stopped from using the seed from one year's production for next year's planting. The Act only prevents the producer from selling the production as seed to another entity. Consequently, the holder of the property right on the genetics may look for alternative arrangements to capture the value of genetics. Contract production can be used to do that by requiring producers to buy certified seed and deliver all production to the writer of the contract.

However, farmers appear resistant to abandoning the open market. Boehlje (1996) has observed that such institutional change has met resistance from farmers, most possibly because these new ways change relationships and frequently substitute interdependence for the much-cherished independence. A better understanding of farmers' attitudes, knowledge, and preferences concerning the use of new forms of vertical coordination would be informative to all supply chain participants. Such an understanding would allow for the design of more efficient arrangements. In this paper we provide insight on grain producers' attitudes by analyzing two populations of wheat growers: (1) members of the American White Wheat Producers Association (AWWPA) growing hard white wheat (HWW) under contract for the association; and (2) Kansas wheat growers not producing for AWWPA.

The focus was not AWWPA, which already has been well documented. It was selected for this study because it is the major, young, niche marketing cooperative in Kansas, which provides an opportunity to make meaningful comparisons and contrasts of grower attitudes and behavior (Brester, Biere, and Armbrister; 1996; Duval, 1996). We believe that to research this situation could provide more accurate information than asking growers hypothetical questions based on an imaginary situation.

The survey methods are reported in Section 1. Survey results of AWWPA members and nonmembers, respectively, are presented in the Section 2 and Section 3. The regression analysis of membership probability and farmers' willingness to contract are discussed in Section 4. Section 5 discusses results, after which conclusions are drawn.

1. METHODOLOGY

The study is based on two surveys: one was directed to AWWPA member-producers and the other to the larger population of Kansas wheat growers not member of AWWPA. Throughout this paper, we use the terms member and nonmember to designate each group, respectively. Each of the 250 AWWPA members received a questionnaire by mail in September 1995. Those who did not respond were sent a second questionnaire. The response rate after two mailings was 60% or 149 respondents.

For the survey of other Kansas wheat growers, Kansas Agricultural Statistics selected a random sample of 1,500 from its database of wheat growers operating in the western two-thirds of the state, where most of the wheat is grown. After four mailings made in October and November 1995, 25% had completed and returned the questionnaires. Kansas Agricultural Statistics used phone interviews to supplement the mail responses, producing 792 responses and a higher response rate of 53%.

The two survey instruments were designed to allow for comparison of the results between the two samples. The instrument for the current HWW producers was designed to allow comparison of qualitative and quantitative measures of technical and agronomic aspects of HWW and to gain an understanding of current producer perception of HWW production and marketing. Also included were open questions on the major constraints of HWW production, the justification for a premium, and whether or not they would recommend HWW production to others. Finally, specific questions addressed the AWWPA marketing agreement.

The Kansas wheat growers' questionnaire had four parts. The introduction to identity-preserved production and AWWPA printed at the beginning of the survey said:

> Identity-preserved grains are not marketed through the standard commodity marketing system. They are specialty grains raised for their special qualities and must be marketed in a way that the special qualities are maintained. In such a system the price received by growers usually exceeds the price one could receive on the commodity market. However, to produce an identity-preserved grain the farmer must enter into a production contract with the buyer before planting. Hard white wheat is an example of an identity-preserved grain. This wheat is very similar to hard red winter wheat. Yields, resistance and agronomic practices are the same as for red winter wheat. However, white wheat appears to have better milling characteristics and produces whole-wheat flour that is milder and sweeter than that from red wheat. The American White Wheat Producers

> Association (AWWPA), a grower cooperative, has been licensed by Kansas Agricultural Experiment Station and AgriPro to distribute seed from varieties bred by those two organizations. AWWPA contracts with member farmers to produce white wheat.

Questions in Part I focused on the respondent's awareness of AWWPA and HWW production. Questions in Part II focused on producers' attitudes concerning contract production, cooperative versus private firm arrangements, and their willingness to consider producing HWW under the conditions of the AWWPA contract. Also included was an open-ended question asking for the two major reasons why the respondent was not growing white wheat.

Part III began with a seven-line introduction on the requirements to produce HWW for AWWPA:

> To grow hard white winter wheat you must become a member of the AWWPA by purchasing common stock: $100.00 for each 100 acres planted and sign a production/marketing agreement with the AWWPA. You must plant on clean ground (land not previously in wheat) using only certified seed purchased from an AWWPA dealer and avoid mixing your white wheat with other wheats. You may have to pay storage or provide on-farm storage for up to 9 months. If your wheat does not meet AWWPA quality standards, you will receive feed wheat price.

Respondents were asked for their first constraint to producing HWW. Four Likert scale questions tested for important issues, such as a need for a guaranteed premium and risk aversion. As in the white wheat producer questionnaire, wheat growers were asked to indicate the number of acres they would plant for different levels of premium and to pick one of the three payment options offered in the AWWPA contract.

Questions in part IV asked for the respondent's demographic characteristics and experience with contract production and cooperative membership.

2.1. AWWPA Members' Survey Results

Results related to AWWPA organization and to the technical aspects of HWW production are not reported here, because they are not relevant to the differences and similarities between AWWPA members and nonmembers. These results are available upon request.

More than 70% of our respondents had started producing HWW in 1993. All the HWW producers were males. The average producer farmed on 2000 acres and grew wheat on more than 850 acres. On average, 70% of the respondents' gross income came from crop production. Average, reported, net farm income was $50,000, but income varied greatly among farms, and 15% of the producers had a net income of at least $100,000. Fifty-four percent of the producers had no off-farm employment. Most of the producers had been farming for more than 10 years and often between 20 and 30 years.

Table 1. AWWPA Members' Attitudes toward HWW Contracted Production

	Disagree	*Agree*
HWW is a different crop, not just a new wheat variety	41%	59%
Farmers are reluctant to grow a crop under contract.	39%	59%
I prefer not to produce under a production contract.	74%	22%
It is not risky to produce white wheat.	66%	33%
I prefer to contract production with a cooperative rather than with a private or investor owned firm.	40%	52%
	Frequency	
Yes, I would recommend HWW to other farmers	76%	

A majority of producers (57%) had been convinced to grow HWW by the AWWPA promotional material. Other farmers (21%) and extension agents and University personnel (14%) also played a key role. Popular press was cited by 5% of the producers.

Fifty-two percent of the producers were growing white wheat for strategic purposes: to be the first to benefit from the HWW market development or for diversification purposes. Twenty-nine percent of producers were growing HWW to raise top quality wheat.

None of the three payment options offered by the AWWPA was disliked.[1] The pooling option was the most attractive, with almost 50% of the producers choosing it. Twenty-nine percent of the respondents had chosen to grow white wheat because of the attractiveness of the price options. A larger white wheat market and a more certain patronage dividend forecast would have made members increase their HWW acreage. No respondent agreed to lower the quality standards.

Seventy-four percent of the members preferred contracted production (Table 1). However, 59% thought that other farmers would be reluctant to grow HWW because it is a contracted crop. Fifty-two percent preferred to contract with a co-op rather than with a private firm.

Ninety-seven percent of the producers considered the price premium necessary. Fifty percent of the producers said the premium was a necessity because of the extra costs, cares, and precautions involved in producing an identity-preserved grain. Those specifically included separate storage, extra weed control, and extra machine cleaning. Twenty percent directly quoted seed price as a justification for a premium. The risk related to HWW market came third, cited by 15%. The fact that the wheat was not readily marketable and the weakness of the HWW varieties (yield variability, poorer winter hardiness, sprouting in the head) each accounted for 10% of the responses.

When asked about the main constraint, the identity-preserved requirements came first followed by the market and the delivery, the varieties, and the storage (Table 2). Clean ground was reported by more than 10% of the producers as a

Table 2. Main Constraints of HWW Production, Member Responses

Constraints	*Relative Frequency (%)*
Identity-preserved constraints	22
Risk and market	20
HWW varieties	17
HWW not readily marketable	14
Other (mainly clean ground)	13
Delivery	13
Seed costs	7
Payment delays	7
Low premium	7

major constraint to expanding their HWW acreage. Only 7% of the producers said the premium was so low that it was a major constraint.

Seventy-five percent of the respondents would recommend HWW production. Half the respondents that did not recommend producing HWW mentioned payment delays and weak varieties. Also cited were the identity-preserved constraints, the market and its associated risk, too low a premium, and too high a seed cost. Stock requirements, harvest delivery, and transportation costs did not appear in the list of the reasons not to recommend HWW production.

2.2. Nonmembers' Survey Results

Respondents farmed in Central and Western Kansas. The average farm grew 800 acres of crops including 400 acres of wheat. Based on statistics of all Kansas farms from the *1992 Kansas Census of Agriculture* and *1994 Kansas Farm Facts,* we concluded that our sample was representative of wheat farms from Central and Western Kansas, where most of the Kansas wheat is grown.

Seventy-two percent of our sample had more than 20 years experience in farming. Ninety-five percent had more than 10 years of experience. Seventy-three percent of the farmers had never produced under contract. Fourteen percent of respondents had never been a member of a cooperative organization. Most of the respondents also had a net farm income below $50,000. The percentage of gross income coming from crop production was below 50%, on average. Thirty-one percent of farmers and 46% of the spouses had off-farm employment.

The reasons quoted for not producing HWW are summarized in Table 3. Nonawareness was first, followed by market risk and transportation costs. Other reasons tended to relate to independence and concern about available varieties. Note that 17% of our sample just did not want to alter production because they enjoyed current practices (HWW was perceived as a different crop by 65% of the respondents), and 30% were concerned about the extra work and management involved in producing identity-preserved HWW. Only 16% suggested that the price premium was too low or that the price was not feasible.

Table 3. Major Reasons for Not Producing HWW, Nonmember Responses

Reasons	*Relative Frequency (%)*
Didn't know...Haven't been contacted	71
Market, risk and transportation	30
Doubt about varieties quality and adaptability	19
Don't want to change, like what they are doing	17
Mixing, cross contamination, storage	16
Too much trouble, time consuming	14
Contracts, AWWPA requirements	10
Clean ground	9
Low premiums	9
Certified seed to be purchased	8
Costs, price not feasible	7
Newness, quality standards	5

The requirements to contract with the farmer cooperative, AWWPA, also was quoted as reason for not growing HWW. Sixty-three percent of the producers preferred not to produce under a production contract. However, 53% would rather contract with a cooperative than with a privately owned firm.

Results from the only open question on the Kansas wheat grower questionnaire summarized in Table 3 are confirmed by answers to the specific open-ended questions in Table 4. The major constraint to growing HWW was the storage constraint followed by the contract, itself. Some farmers also identified extra work to avoid mixing, the requirement to purchase certified seed, and the quality controls as major constraints.

Eighty percent said they would produce HWW only when the premium was guaranteed. Fifty-five percent of the wheat farmers would favor a fixed basis over

Table 4. Nonmembers' Attitude toward HWW Contracted Production

	Frequency	
My first constraint to growing white wheat is:		
Storage up to nine months	44%	
The contract	32%	
To plant on clean ground	18%	
Extra work to avoid mixing	16%	
The purchase of certified seed	11%	
The inspections	10%	
	Disagree	*Agree*
HWW is a different crop, not just another variety of wheat.	33.5%	65.5%
I prefer not to produce under a production contract.	30%	69.5%
I would prefer to contract production with a cooperative rather than with a private or investor owned firm.	47%	52.5%
I will produce white wheat only when the premium is guaranteed.	20%	79%
Producing HWW is risky.	25%	74%
I am afraid my fields may fail the final inspection.	52%	49%
I would grow white wheat only if I were not required to sign a production contract and could sell on my own.	41%	58%

Table 5. Estimated Parameters of Factors Affecting Membership Probability and HWW Acres Likely to Be Planted

Dependent Variable:	*Membership (0 for nonmembers; 1 for members)*	*HWW acres (% of total wheat acres)*	
Data	*Member and Nonmember data*	*Members survey data*	*Nonmembers survey data*
Variables	*Model 1*	*Model 2*	*Model 3*
Premium 2		5.126E-05	4.621E-05
		(18.04)	(22.29)
HWW cost		-0.0664	
Perception		(3.94)	
Desire to grow high		0.0699	
quality wheat	(2.95)		
Prefer co-op	0.4369	0.0627	-0.028556
To private Co.	(4.39)	(4.92)	(2.67)
Preference not to	-1.1327	-0.0331	-0.032323
Contract	(25.08)	(2.07)	(2.83)
Off-farm	-0.0201		0.001661
Work hours	(5.69)		(4.35)
Years of	-.3275		-0.052422
Farming	(1.89)		(4.39)
Experience	-5.1232		
With cooperatives	(12.35)		
Total wheat acres	0.00175	-2.67E-05	
	(73.48)	(3.78)	
Net Farm Income	0.1186	0.0295	
	(.92)	(3.6)	
Don't grow because did	0.035958		
not know	(3.21)		
Familiar			0.039498
With AWWPA			(3.72)
Intercept	5.0186	0.0377204	0.15843
	(8.58)	(0.38)	(3.00)
R-squared		0.42	0.17
Model F-stat		30.54	85.494
-2 Log Likelihood	328 (p=0.0001)		
Observations	604	591	2879

Note: numbers in parenthesis are Chi-square values for model 1 and t-values for model 2 and 3.

the Hutchinson, Kansas, cash price. Thirty-six percent would favor a fixed contract price. Very few respondents (5%) chose pooling with installment payments. Fifty-seven percent of our sample said they would grow white wheat if they could sell their product independently.

3. Survey Data Analysis

The objective of the following analysis is to identify the factors affecting producers' decisions to join AWWPA and plant HWW. To do so, we first merged com-

parable data from members and nonmembers to run a logistic regression. We constructed the dependent variable as a binary variable with a value of one for a member and zero for a nonmember. Independent variables chosen were demographic variables, preference for not producing under contract, previous membership in a cooperative, and preference for contracting with a cooperative rather than a private company or investor owned firm (IOF). Results from model 1 are presented in Table 5. Predicted probabilities and observed responses are 92% concordant, and the global null hypothesis is rejected at less than the 1% level. It shows that the probability of membership in AWWPA increases significantly with the preference to contract and the preference to contract with a cooperative. The probability that a farmer is an AWWPA member decreases significantly when the farmer has already been a member of a cooperative other than AWWPA, when the

Table 6. Expected Signs of Selected Variables for Model Building

Selected variables	*Expected Sign*	*Rationale for including the variable*
Premium	+	Number of HWW acres is likely to increase at an increasing rate as the premium rises.
HWW cost perception	+	Cost-conscious producers are likely to plant fewer HWW acres as HWW costs more to produce than HRWW.
Prefer co-op to private Company	+	Farmers that prefer working with cooperatives are likely to plant more acres for AWWPA.
Cropland acres	+	The more acres a farmer has, the more likely he is to diversify and plant HWW.
Net income	+	High-income farmers may be willing to plant more HWW, because the perceived costs/risk is lower for them.
Desire to raise quality wheat	+	Farmers that desire to raise high quality wheat are likely to plant more HWW at any premium level.
(Non-) Risk perception	+	Risk-averse farmers will likely plant fewer HWW acres, because HWW production is an emerging market.
Experience with contracts	+	Producers with previous contracting experience are likely to plant more HWW.
Income from crops	+	Producers that are more involved in crop production may be more attracted by HWW production.
HWW yield relative to HRWW perception	+	Perception of a higher HWW yield certainly would increase producers' willingness to plant HWW.
Prefer not to contract	-	Farmers that prefer contracting production will be more willing to contract with AWWPA to plant HWW.
Off-farm work hours	-	Farmers working off-farm may have no extra time to spend caring for their HWW and may plant fewer acres than full-time farmers.
Years of farming	-	Older farmers may have no desire to change or improve their current production or income level.
Experience with Cooperatives	+	Farmers that have already been co-op members are likely to understand better the advantage of being an AWWPA member and contract more HWW acres.
Familiarity with AWWPA	+	Farmers that are aware of the HWW market and AWWPA methods may be willing to contract more HWW acres.
Didn't grow HWW because didn't know about it	+	Farmers selecting unawareness as their primary reason for not growing HWW are likely to be more receptive and willing to plant HWW.

spouse works off-farm. Net farm income and years of farming are not significant at the 10% significance level.

To study member and nonmember responses to possible price premiums, we constructed the variable *S*, the percent of total wheat acres to be devoted to white wheat. By asking respondents the number of acres they would be willing to plant for six different premium levels between $0 and $1, we obtained six observations of *S* for each respondent. Price premium, major demographics variables, contract production variables, and other variables relevant to identity-preserved production were regressed against *S* using linear regression.[2] Expected signs and behaviors of the variables in each sample are described in Table 6. A model with all the variables was run for each sample. To reduce the number of variables in the regression model equations, a SAS stepwise procedure was used to select the seven most significant variables among those previously selected. Models 2 and 3 both have seven variables and are similar to the best seven models found using the SAS maximum R-square procedure. All variables are significant at the 5% significance level in each model. Estimates of models 2 and 3 are presented in Table 5.

Forty-two percent of the variations in the share of wheat acres planted to HWW were explained using the seven most significant variables of the AWWPA members' survey. Seventeen percent of the variations in the share devoted to HWW acres were explained using the seven most significant variables of the nonmembers' survey. Premium (squared) was highly significant in all the models. As the premium increased, the share of wheat acres planted to HWW increased at an increasing rate (in the range considered).

The preference for contracting with a cooperative rather than a private company was significant in both models but had a different effect on the AWWPA members compared to the larger population of nonmembers. Unlike AWWPA members, nonmembers were likely to plant more HWW as their preference for contracting with cooperative diminished. Farmers with no particular preference between cooperative and IOFs may be more open to new ideas such as the production of specialty wheat. The perception of the question is different for AWWPA members, because they already are involved in the cooperative. For the AWWPA respondent, saying that he would prefer contracting with a cooperative meant that he liked contracting with AWWPA. Hence, an AWWPA member preferring cooperatives was likely to plant more HWW acres.

In both regressions, respondents who (1) preferred producing under contract, (2) had farmed for fewer years, and (3) previously had been members of a cooperatives would tend to plant more HWW. AWWPA members' willingness to plant identity-preserved white wheat depended positively and significantly on members' net income and desire to grow high quality wheat. Nonmembers' willingness to plant identity-preserved grain as described in the survey was negatively and significantly affected by years of farming (a proxy for age), and preference not to produce under contract. The number of off-farm work hours significantly and

positively affected nonmembers willingness to produce identity-preserved grain. A two-way frequency analysis revealed that nonmembers working off-farm had smaller farms, were younger farmers, and had lower farm income. Such farmers may want to increase their farm incomes and may see identity-preserved production as an opportunity to do so.

4. Discussion

Although both groups raised wheat, the characteristics of operators and operations differed substantially between members and nonmembers. Awareness of those differences may be useful to any effort to organize a new supply chain involving grain producers. In this situation, the AWWPA members must be considered the innovators. They were significantly younger and had higher net income than nonmembers. They managed larger farms and were more specialized in crop production. Reasons given by AWWPA members for producing HWW under contract with AWWPA indicated that these producers have a proactive attitude towards new market opportunities.

Another aspect is the transaction cost associated with adopting this new form of production and marketing. Search and information costs may keep some operators from considering new arrangements and new behaviors. These results show the importance of direct personal contact. AWWPA members had been convinced primarily by AWWPA promotional material, other farmers, and university personnel. Most nonmembers said that they did not produce HWW because they had not been contacted. Those farmers were not likely to initiate the contact with a new organization developing identity-preserved grain. Their responses indicated a more passive behavior, that is, waiting to be convinced by someone else. In this regard, organizations already having close ties with farmers may have a better chance of obtaining farmer participation in a new supply chain arrangement than a new entity, be it a farmer cooperative or an IOF.

Nonmembers strongly preferred not to produce under contract, and they were less inclined to give up their freedoms associated with using the commodity market. Among the considerations was the fact that few had had experience with contract production. Consequently, they must be convinced of the benefits of value-added and identity-preserved production. With an agricultural economy predominantly of commodity grain and livestock production, Kansas has little specialty agricultural production from which farmers could observe and draw inferences.

Furthermore, Kansas lacks an infrastructure to handle the logistics of marketing differentiated grains efficiently and effectively. Consequently, nonmembers considered HWW a different crop. The change in the supply chain coordination alone made it a different crop in their eyes. Obtaining acceptance of a new supply chain may be as hard as convincing farmers to produce a new crop.

All AWWPA members understood that high quality standards are necessary to receive price premiums. They clearly associated quality with higher price. This result implies that pricing based on quality is a practice most farmers might accept.

Another observation concerned risk, especially the risk of failure of the cooperative organizing the supply chain. Nonmembers appeared to be concerned about the newness of the cooperative. In addition, they had concerns about the market size, the productivity of the white wheat varieties, and producers' risk of failing the quality controls. In the first regard, the nonmembers concern became real 2 years later in 1997, when AWWPA was forced to reorganize under the protection of the bankruptcy laws. The details of the crisis are too complex to include here, but a brief review is in order.

The leading cause of the AWWPA financial crisis was an inappropriate hedge position required by its creditor. The creditor approved a large sale of flour to a major bakery only on the condition that the sale be hedged. The hedge position would have been proper if the cooperative and its members did not already own the grain from which the flour was to be milled, but that was not the case. At the time of the bankruptcy proceedings, the cooperative sued the creditor, insisting that the creditor was responsible for the cooperative making the hedge that produced huge losses as wheat prices rose in spring 1997. Although the cooperative won the suit, which greatly improved it finances, the court treated as junior creditors the farmers who had committed grain under the pooling option, apparently because they were part of the cooperative. Consequently, farmers using the pooling option did not receive their final payment for their grain. It was an unpleasant experience for those producers and for the management of the cooperative. This illustrates well the risk a farmer assumes when choosing a pooling option as a member of a marketing cooperative.

The newness of the cooperative only compounded the risk. Whether the entity is a cooperative or an IOF, a new entity often has a smaller capital base than a more mature, successful one. The level of capital is important to the ability of the entity to weather adversity like the case discussed above.

The cooperative has reorganized and is in operation again. The crisis was a learning experience for all involved. Although costly, learning experiences such as that—if not fatal—can contribute to the development and growth of a new enterprise. The risks must be appreciated, and economic agents can be expected to incorporate a risk premium.

Creating a significant supply of an identity-preserved grain may require the marketing organization to deal with the perception of the level of risk involved. One concern for a supply chain integrator is providing evidence and assurances about the real risks involved. Perceptions of risk can be reduced by the way in which the marketing agreement or production contract is written and by the nature and history of the organization with which the producer is asked to sign. A large, vertically integrated IOF may be able to convince producers to commit based on

its track record in marketing other products. Indeed, these agribusinesses have experience in developing new markets and supply chains and have the capability to channel the production to consumers. In contrast, a young, open-membership cooperative offering a similar production contract may not be able to convince farmers to grow identity-preserved grains because of the perceived risk. A cooperative involved in the development of a new supply chain needs very strong support from its members. A closed-membership cooperative may help to assure that support (Harris, Stephanson and Fulton, 1996). Useful examples may come from the experience of closed cooperatives in California and North Dakota, for example, marketing value-added products (Torgerson, 1995).

The constraint of farm storage for up to 9 months was specific to early AWWPA production contracts and is not characteristic of identity-preserved production. This storage requirement was set up during the first years of operation to reduce costs to the cooperative, because AWWPA could not afford to pay or organize storage. The survey showed that identity-preserved production already was perceived as constraining by nonmembers. Adding other constraints only adds to growers' resistance.

Nonmembers seemed very attached to their freedom to market, which only confirms Boehlje's observation. Similarly, they did not like the requirement to use only certified seed. Seventeen percent of the nonmembers did not want to change practices. Fourteen percent said identity-preserved production is too much trouble and time consuming. However, a two-way frequency analysis showed that the most reluctant farmers tended to be older farmers who were not interested in changing practices to increase income. Overall, a majority of the Kansas wheat growers seems to be open to the idea of producing identity-preserved grains under contract and with a guaranteed premium. However, designing a mechanism that attracts producers may be more complex than expected. Offering undecided growers incentives to try the identity-preserved varieties on a small scale before becoming a co-op member could increase their willingness to participate.

5. Conclusion

The results show some of the diversity of farmers' attitudes, preferences, knowledge, and willingness to act. Here we considered the members of AWWPA as innovators, and they possessed characteristics expected of innovators. They had larger farms and higher incomes, were more specialized into wheat production and were less involved in off-farm employment. As innovators, they were more inclined to search out information on new opportunities, such as AWWPA, and more willing to take the risk associated with a new concept. Two reasons frequently given for engaging in this activity were the desire to be the first to benefit from raising this identity-preserved grain and a desire to raise high quality wheat. Both desires are not associated with short-term profitability but with a willingness

to explore future potential. Finally, the members were more amenable to producing under contract and more committed to cooperative methods.

The members actively pursued the production of white wheat, but gaining the commitment of others will require more selling. The nonmembers were more passive about the opportunity and more inclined to be guided strictly by short-term profitability than by any promise of future benefits. This is an important point, because resource-based theory of the firm notes that it is the idiosyncratic investments of time and experience that can be among the most distinguishing factors in the success of a venture (Wernerfelt, 1984).

The nonmember population expected more personal selling before considering the opportunity. It also showed lower support for contract production and lower preference for cooperatives over the IOF as the integrator. Thus, a strong sales force is needed to get producers to commit, whether it is white wheat or hogs or whether the integrator is a cooperative or an IOF.

The econometric model showed that regardless of the group, those inclined to consider production tended to be willing to produce under contract, had higher incomes, had farmed for fewer years, and had prior membership in a cooperative. The model also showed that premiums would make a difference. However, the price premiums required to get substantial commitment appear larger than those reasonably expected. A question is whether or not that premium requirement could be lowered through education about the subject and growers learning of a new way of doing business.

While both groups appeared to appreciate risk, the nonmembers seemed to be more concerned about risk. As the AWWPA cooperative has experienced, risks exist. The difference between members and nonmembers is the willingness to take the risk or the degree of risk each sees. Large and experienced agribusinesses with intangible capital may be able to lower the perceived risk. Kansas farmers, like any farmers who produce for the commodity market, may not be ready yet for the structural changes occurring in US agriculture. Some farmers, like the members of the 21st Century Alliance, wish to capture some of the benefits associated with the new forms of supply chain coordination by creating new more vertically integrated cooperatives, such as U.S. Premium Beef. Future research and extension may be directed at finding ways to lower farmers' risk perception and improve farmers' ability to see institutional change in agriculture as an opportunity rather than a constraint.

NOTES

1. AWWPA offers three payment options: a fixed basis over a cash price, a fixed price specified in the contract, and a pooling option.
2. Some logistic regression models of a binomial version of S also were run, and results confirmed the importance of the factors identified using simple linear regression models.

REFERENCES

Boehlje, M. 1996. "Industrialization of Agriculture What Are the Implications?" *Choices*, First quarter, 30.

Brester, G. W., A. Biere, and J. Armbrister. 1996. "Marketing Identity-preserved Grain Products: The Case of the American White Wheat Producers Association." *Agribusiness: An International Journal, 12*(3): 301.

Duval. Y. L. 1996. *Matching Marketing Cooperative and Member Needs: The Case of the American White Wheat Producer Association.* Unpublished MS Thesis, Agricultural Economics, Kansas State University.

Harris, A., Stefanson B., and Fulton M. 1996. "New Generation Cooperatives and Cooperative Theory." *Journal of Cooperatives, 15.*

Kansas Agricultural Experiment Station. 1991. *Hard White Winter Wheat Research, 1991 Report.* Manhattan, KS: Kansas Agricultural Experiment Station.

Kansas State Board of Agriculture. 1994. *Kansas Farm Facts 1994.* Kansas Agricultural Statistics.

King, R. P. 1997. *New Theories of the Firm.* American Agricultural Economic Association Workshop in Toronto, July 30.

Robeson, J. F., and W. C. Copacino. 1994. Andersen Consulting, *The Logistics Handbook.* New York: Free Press.

Torgerson, R. E. 1995. "Current Cooperative Boom in the Midwest." *Journal of Agricultural Cooperation, 44.*

USDA. 1994. T*he 1992 Census of Agriculture. Kansas.* Washington, D.C.: United-States Department of Agriculture.

Wernerfelt. B. 1984. "A Resource-based View of the Firm." *Strategic Management Journal*, 5: 171.