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An Analysis of Contracts in the Idaho Processing-Potato Industry

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This paper presents an analysis of a sample of contracts used by the Idaho processing-potato industry in recent years. A particular focus is on the price- and quality-related provisions of these contracts. Potato growers are paid an incentive-adjusted price. This price is calculated using a complex system of incentives and penalties for potato size and quality characteristics. These size and quality factors are those that most directly affect product recovery (finished product as a percentage of raw-product usage) and the processed-product quality. Although most of the provisions of the analyzed contracts are similar, there are some differences in the level and scope of incentives and penalties. The paper concludes by suggesting directions for future research in this area that would help shed light on the effectiveness of contractual relations in the analyzed industry.

Contracts in production and marketing of agricultural products are important market mechanisms used to ensure the effective market exchange that provides benefits for producers of agricultural commodities and buyers of these commodities. Some contracts are simple open-market transactions and some contracts are complicated schemes that involve participation of both agricultural producers and food manufacturers in the production and marketing decision-making process. The structure of contracts used in the industry and the effectiveness of economic performance of contract parties influence the profitability of the industry and its competitiveness.

Only a limited number of agricultural markets have received attention in the empirical literature on agricultural contracting. Studies like these depend on data available for the analysis, which are often difficult to obtain. While the poultry and pork industries have received significant attention in previous literature, contracts used in various crop and vegetable markets have received a very limited attention.¹ To the best of our knowledge, there is no study that has examined contracts in the potato industry.

This paper conducts an analysis of contracts used in the Idaho processing-potato industry. Idaho is a leading producer of potatoes in the country, with approximately a 30-percent market share in terms

of the value of potato production. Large potato-processing companies located their plants in Idaho to take advantage of an abundant supply of high-quality potatoes. These companies are involved in manufacturing frozen and dehydrated potato products and they have a long history of involvement in potato contracting. They make extensive use of pre-season contracts to ensure a steady supply of raw potatoes throughout the year. These are extremely complex contracts in which the price received by the grower is an incentive-adjusted base price, which is based on a comprehensive set of potato-quality characteristics. This paper focuses on analyzing the price- and quality-related provisions of the contracts used by frozen-potato-product manufacturers.

Section 2 of this paper presents a brief overview of the Idaho processing-potato industry and is followed by a section discussing the U.S. Standards for Grades of Potatoes for Processing. The next section presents analysis of the price- and quality-related contract provisions, and is followed by the conclusion.

Idaho Processing-Potato Industry

The two largest processing-potato sectors represented in Idaho are manufacturing of frozen potato products and manufacturing of dehydrated potato products. Frozen potato products typically include frozen french fries, and dehydrated potato products include potato flakes and granules. Frozen-potato-product manufacturers extensively use pre-season contracts with potato growers to guarantee a stable supply of consistent quality potatoes to be used in processing. The price specified in these contracts is

¹ Bolotova and Patterson (2008) presents a brief summary of this literature.

tioned to a comprehensive set of potato-quality characteristics that are crucial for producing a desired quality of processed-potato products. Dehydrators typically rely on fresh-market off-grade potatoes that they buy from potato packing sheds (potato distributors) and they also use contracts with potato growers. There is a small industry segment producing potatoes to be processed into potato chips. However, there is no potato-chip processing facility in the State.

As reported by Idaho Potato Commission, there are 11 potato processors in Idaho. Some of them are large multinational companies with a long history of involvement in potato processing. As reported by the latest Census of Agriculture, there were 818 potato-producing farms in Idaho in 2002. Approximately 70 percent of all potato acres and potatoes produced are concentrated in 27 percent of all farms. Some potato farms are involved exclusively in producing potatoes for processing markets and some farms produce potatoes for both processing- and fresh-potato markets. Given that the number of processors is small relative to the number of potato growers, a bargaining association represents the interests of processing-potato growers in the contract-negotiation process with potato-processing companies. The Southern Idaho Potato Cooperative (SIPCO) currently serves this function.

Standards or Grades of Potatoes for Processing

The quality standards for potatoes used in processing are based on the United States Standards for Grades of Potatoes for Processing. The standards establish two grades: U.S. No. 1 Processing and U.S. No. 2 Processing. The major difference between these two grades is in terms of the size of potato tubers. U.S. No. 1 individual potatoes shall be not less than two inches in diameter or four ounces in weight. U.S. No. 2 individual potatoes include whole potatoes and usable pieces; whole potatoes shall be not less than 1.5 inches in diameter and usable pieces shall be not less than four ounces in weight. The standards allow specifying the percentages of a larger size(s) and a maximum size(s).

U.S. No. 1 processing potatoes are required to be fairly well shaped and free from damage by any cause. U.S. No. 2 processing potatoes are required to be not seriously misshapen and free from serious

damage by any cause. The standards also specify the maximum allowed for processing percentages of external and internal defects and a procedure for the specific-gravity test. These percentages are typically lower for U.S. No. 1 processing potatoes than for U.S. No. 2 processing potatoes. Some examples of external defects include bruises, cuts, nematodes, and scab. Some examples of internal defects are internal discoloration, net necrosis, brown center and hollow heart.

Analysis of Processing-Potato Contracts

This section analyzes the price- and quality-related provisions of contracts that were used by three processors involved in manufacturing of frozen potato products in Idaho in one recent year. We refer to these contracts as Contract A, Contract B, and Contract C. The analyzed contract provisions are summarized in Table 1 and are discussed below. These contracts are pre-season contracts; they are signed prior to the potato-planting season. In Idaho, potatoes are planted in the spring (April and May) and are harvested in the fall (August through October).

The processing-potato contracts analyzed in this paper are for immediate delivery of potatoes from the fields to the facilities of processing companies (processing plants or storage facilities). Typically, potato growers are responsible for delivery of potatoes from their fields to the locations of processors. In this case, potato processors pay a hauling allowance to potato growers. There are also contracts concluded by the same companies that require that potato growers store potatoes for up to ten months before delivering them to the processors. Additional compensation is paid to the grower based on the length of storage and the type and quality of the storage facility. In terms of the quality incentives, contracts without storage and contracts with storage are very similar. The potato contracts with storage impose a range of additional conditions on the grower, but these conditions are beyond the scope of this paper and will not be discussed here.

The analyzed contracts are for Russet Burbank potatoes. This variety is the most popular potato variety, which is very well suited for both fresh- and processing-potato markets. In addition, this is the potato variety which is traditionally used to produce frozen potato products. The largest share of frozen potato products is represented by french fries. The

Table 1. Idaho Processing-Potato Contracts: Summary of the Price- and Quality-Related Provisions.

Contract provision	Contract A	Contract B	Contract C
Potato tuber size	Not less than 2 inches in diameter or 4 ounces in weight		
Base price	\$4.83/cwt	\$4.86/cwt	\$4.71/cwt
Incentives/penalties to the base price			
Specific gravity (incentives/penalties are for each 0.001 of the specific gravity level within the indicated range, unless otherwise mentioned)	Incentives \$0.05/cwt if above 1.078 to 1.085	Incentives \$0.05/cwt if 1.080 or 1.081 \$0.10/cwt if 1.082 or 1.090 \$0.15/cwt if 1.083, 1.087, 1.088, or 1.089 \$0.20/cwt if 1.084, 1.085 or 1.086 \$0.10 if above 1.090	Incentives \$0.05 if above 1.079 to 1.088 \$0.45 if 1.089 or 1.090 \$0.40 if 1.091, 1.092 and above
	Penalties \$0.05/cwt if above 1.087 to 1.094 \$0.05/cwt if below 1.078 \$0.10/cwt if below 1.074 If below 1.074 or above 1.100, the company's option to reject or re-negotiate price	Penalties \$0.05/cwt if below 1.078 \$0.10/cwt if below 1.074	Penalties \$0.05/cwt if below 1.078 to 1.074 \$0.10/cwt if below 1.074
Potato size (incentives/penalties are for each percentage-point within the indicated range)	Six-ounce and larger grading U.S. No.2 or better for processing	U.S. No. 2 processing grade <u>Location A:</u> ten-ounce and larger	Ten-ounce or larger U.S. No. 2 for processing or better
	Incentives \$0.03/cwt if above 60% to 71%	Incentives \$0.01/cwt if above 22% Max \$0.14/cwt at 36%	Incentives \$0.02/cwt if above 21% Max payable at 45%
	Penalties \$0.03/cwt if above 75% to 82% \$0.03/cwt if below 60% Below 45%: company's option to reject or re-negotiate price	Penalties \$0.01/cwt if below 22% <u>Location B:</u> six-ounce and larger	Penalties \$0.02/cwt if below 21%
		Incentives \$0.01 per cwt if above 48% Max \$0.22/cwt at 70%	
		Penalties \$0.01/cwt if below 48%	

Table 1. Idaho Processing-Potato Contracts: Summary of the Price- and Quality-Related Provisions (Continued).

Contract provision	Contract A	Contract B	Contract C
US No. 1 potatoes share: two inches or four ounce minimum size (incentives/penalties are for each percentage-point within the indicated range)	Incentives N/A Penalties \$0.02/cwt if below 50%	Incentives \$0.01/cwt if above 60% Max of \$0.15/cwt at 75% Penalties \$0.01/cwt if below 60%	Incentives \$0.01 per cwt if above 60% Max payable for 85% Penalties \$0.01/cwt if below 60%
Bruise-free (incentives/penalties are for each percentage-point within the indicated range)	Incentives \$0.015/cwt if above 60% to 85% Penalties \$0.015/cwt if below 60% to 35%	Incentives \$0.01/cwt if above 72% Penalties \$0.01/cwt if below 72%	Incentives \$0.015/cwt if above 65% Max payable at 90% Penalties \$0.015/cwt if below 65%
Sugar ends (darkends) (incentives/penalties for each percentage-point within the indicated range)	Incentives \$0.01/cwt if below 6% Penalties \$0.05/cwt if above 10% \$0.10/cwt if above 15%	Incentives N/A Penalties \$0.05/cwt if above 8%	Not mentioned
Fry color (sugar color) (incentives/penalties for each percentage-point of the fry color USDA #3 or darker within the indicated range)	Not mentioned	Incentives N/A Penalties \$0.05/cwt if above 6%	Incentives N/A Penalties \$0.0075/cwt if above 8%
Dirt and foreign material (penalties are for each percentage-point within the indicated range)	Penalties \$0.03/cwt if 7%–10% \$0.05/cwt if at 11% and above Above 10%: company’s option to reject or re-negotiate price	Penalties \$0.01/cwt if above 1% and less than 7% \$0.02/cwt if at 7% or above and less than 11% \$0.05/cwt if at 11% or above	Penalties \$0.01/cwt if above 1% and below 7% \$0.02/cwt if at 7% and above and below 11% \$0.05/cwt if at 11% and above

rest of the frozen potato products are produced from the french fries' trimmings; hash browns are an example of this group of frozen potato products.

All three analyzed contracts specify the quantity of potatoes in hundredweight (cwt), which is to be delivered from a specified acreage. All contracts are based on a minimum of U.S. No. 2 processing grade, but with a more stringent requirement for potato size. The base price of contracts is for potatoes that are a minimum of two inches in diameter or four ounces in weight.

The level of the base price differs slightly across three contracts and is in the range of \$4.71 to \$4.86/cwt. All three contracts specify the same set of incentives and penalties (disincentives) for a variety of potato-quality characteristics, although the magnitude of the incentives and penalties and the percentage thresholds for quality characteristics may differ. The processing-potato quality incentives are established for certain percentages (shares) of specified grades and sizes as well as for certain physical internal and external characteristics that are crucial for production of frozen potato products.² For example, the size of the potato tuber, its density, its sugar content, and the absence of internal and external defects are important determinants of high-quality french fries. Quality factors also determine overall product recovery, or the pounds of final product per pound of raw-product processed. The quality of the potato tubers intended for processing into french fries also affects the extent to which french fries are able to retain their quality during the storage period.

Potato Size

All contracts establish a system of incentives and penalties for potatoes that are larger or smaller than a specified size. Contract A provides a \$0.03/cwt incentive for each percentage-point of six-ounce-and-larger potatoes above 60 percent, up to 71 percent. A penalty of \$0.03/cwt is imposed for each percentage-point above 75 percent, up to 82 percent, or below 60 percent. Contract C establishes incentives and penalties for ten-ounce minimum size potatoes. An incentive of \$0.02/cwt is paid for each percentage-point above 21 percent and

a similar-magnitude penalty is imposed for each percentage-point below this threshold.

The incentives and penalties of Contract B depend on the location of the field where the potatoes are grown. In one location, an incentive of \$0.01/cwt is paid for each percentage-point of ten-ounce and larger potatoes above 22 percent and a penalty of \$0.01/cwt is imposed for each percentage-point below 22 percent. In the other location, a similar-magnitude incentive and penalty are for each percentage-point of six-ounce minimum size potatoes above or below 48 percent, respectively. Since a longer growing season in one of these locations produces more large potato tubers (a shift in the size profile), processors use a different tuber size for the incentive payment based on the geographic location of the field, which also corresponds to the length of the growing season.

US No. 1 Potatoes (Two Inches or Four Ounces Minimum Size)

Contract A does not include an incentive based on the percentage of U.S. No. 1 potatoes. However, a disincentive of \$0.02/cwt is specified for each percentage-point below 50 percent. Both Contract B and Contract C establish an incentive of \$0.01/cwt for each percentage-point of this grade above 60 percent and a penalty of the same magnitude for each percentage-point below 60 percent. The difference between these two contracts is in the maximum payable amount, which is set at 75 percent in Contract B and 85 percent in Contract C.

Bruise-Free Potatoes

Contract A has a \$0.015/cwt incentive for each percentage-point of bruise-free potatoes above 60 percent, up to 85 percent. A \$0.015/cwt penalty is imposed for each percentage-point of bruise-free potatoes below 60 percent, down to 35 percent. Contract B includes a \$0.01/cwt incentive for each percentage-point of bruise-free potatoes above 72 percent and a similar magnitude disincentive for each percentage-point of bruise-free potatoes below this threshold. Contract C's incentive is \$0.015 for each percentage-point of bruise-free potatoes above 65 percent, up to 90 percent, and a similar-magnitude penalty is for each percentage-point of bruise-free potatoes below 65 percent.

² All grading and testing procedures are performed by a third party, the Federal-State Inspection Service. The cost of this service is split equally between the grower and processor.

Specific Gravity

Specific gravity characterizes the density of potato tubers; it affects the recovery rate and the quality of frozen potato products. The systems of incentives/penalties for the specific gravity levels are different across the analyzed contracts. There is a pattern suggesting that the processors pay bonuses for specific gravity falling in a certain range and they impose penalties for the gravity above or below the desired range.

Sugar (Dark) Ends and Fry (Sugar) Color

Sugar (dark) ends and fry (sugar) color are two quality characteristics that are important in frozen-potato-product manufacturing because they affect the color and texture of the final product. These quality characteristics are judged based on the presence of dark ends and the color of a sample of fried strips of french fries. Contract B contains only penalties for both effects. A penalty is \$0.05/cwt for each percentage-point of sugar ends above eight percent and the same-magnitude penalty for each percentage-point of USDA fry color #3 or darker potatoes above six percent. Contract A includes both incentives and penalties for sugar ends. An incentive of \$0.01/cwt is for each percentage-point of sugar ends below six percent, and a penalty of \$0.05/cwt for each percentage-point of sugar ends above ten percent, increasing to \$0.10/cwt for each percentage-point above 15 percent. If the percentage of sugar ends is above 19 percent, the company has the option of rejecting potatoes or renegotiating price. Contract C includes a penalty for fry color, \$0.0075/cwt for each percentage-point of the USDA #3 fry color or darker potatoes above eight percent.

Dirt and Foreign Material

All contracts establish penalties for a certain percentage of dirt and foreign material. Contract A imposes a \$0.03/cwt penalty for each percentage-point of dirt and foreign material from seven percent to ten percent, and a penalty of \$0.05/cwt for each percentage-point from 11 percent up. The company reserves the right to reject potatoes or renegotiate price if the dirt and foreign material is above ten percent. Contract B and Contract C both establish a penalty of \$0.01/cwt for each percentage-point

of dirt and foreign material above one percent, a penalty of \$0.02/cwt for each percentage-point from seven percent to ten percent, and a penalty of \$0.05/cwt for each percentage-point from 11 percent up.

Defects

All three contracts include the same set of penalties for internal and external defects of potato tubers. A penalty of \$0.03/cwt is imposed if more than five percent is damaged by insects and nematodes or if more than three percent is damaged by pit scab. A penalty of \$0.05 is imposed if more than two percent is affected by any rot, including frost and wet breakdowns, and a penalty of \$0.10 is imposed if more than five percent is seriously damaged by hollow heart, internal discoloration, net necrosis, or any combination of these symptoms.

Undersize Potatoes

In the case of Contract A and Contract C, undersize potatoes are those of U.S. No. 2 processing grade 1-5/8 inches to two inches in diameter and less than four ounces in weight. In Contract B, undersize potatoes are those of U.S. No. 2 processing grade 1-5/8 inches to two inches in diameter. The price for undersize potatoes is \$2.50/cwt in all three contracts.

Shortage

If a potato grower delivers a smaller amount of potatoes than the contracted number of hundred-weights, the base price is decreased by \$1/cwt. This price reduction is applied to the difference between the contracted and delivered quantity. If the grower delivers his potatoes exclusively to one company, this contract provision does not apply to him.

Conclusion

An analysis of the price- and quality-related provisions of contracts used in the Idaho processing-potato industry suggests that these contractual relations are extremely complex. A comprehensive system of quality incentives and penalties applied to the base price makes it difficult for potato growers to evaluate the expected benefits from participating

in these marketing arrangements. Given that these contracts are signed before the potato-planting season, uncertainty associated with agricultural-input prices adds more complexity in the decision-making process of potato growers over whether to use this marketing alternative. Given the specific features of the processing-potato industry, these contracts are on a take-it-or-leave-it basis, with rejection of the contract solely at the discretion of the processor.

The design of the analyzed sample of contracts implies that potato growers need to have a high level of expertise in potato-production management practices to be able to supply the required quantity of potatoes with desired quality characteristics in order to get as high a price as possible. Potato growers' management decisions have a large influence on the quality of the crop, but so does the weather, which they cannot control. A failure to produce a quality crop, regardless of the reason, will result in an undersupply of potatoes of a desired quality and an oversupply of low-quality potatoes. If this happened to a large group of potato producers, their poor economic performance as a group would adversely affect the profitability of potato processors.

The complexity of the payment system established in the contracts is explained by the nature of the processing-potato products, perishability of raw potatoes, and technologies used by potato processors. Processing companies producing frozen potato products contract a large share of their raw-input supply. By doing this, they ensure a steady supply of a consistent (desired) quality of raw potatoes to be used in processing. These companies have to meet all the obligations that they have to numerous retailers and food services. Processing companies vary total contract volume based on their expectations of the availability and price of open-market potatoes.

One of the issues in the analyzed contractual relations is whether the price level established in these contracts provides a fair level of returns to potato growers that would cover their production costs. Growers are not paid for all potatoes supplied to the processor; they are paid only for certain grades and quality of potatoes. Therefore cost of production based on total yield rather than paid yield understates the grower's true cost.

The sustainability of the Idaho processing-potato industry and its competitiveness on the national and international level depend on effective contractual relations. A preliminary analysis of a sample of contracts presented in this paper suggests several directions for future research to provide evidence on whether the existing contracts are effective enough or whether certain strategies can be used to increase the effectiveness of contractual relations. First, a detailed analysis of the level of contract price versus the potato production costs incurred by potato growers is needed. Second, economic analysis of alternative potato-production management practices is required to provide information for growers on how to improve the quality of their yield to assure the highest level of price paid by processors. Finally, analysis of the data of processing companies may provide invaluable evidence on the actual performance of potato growers in individual transactions. The results of these analyses would provide useful information for the strategic decision-making process of potato growers, potato processors, and the organizations of potato growers.

References

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