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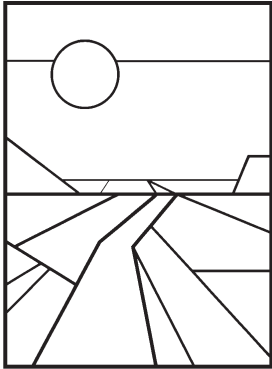
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PURDUE AGRICULTURAL ECONOMICS REPORT

JUNE 1999

Trade Negotiations Coming Again Soon

Philip L. Paarlberg, Associate Professor

This December nations are to begin another round of trade negotiations under the World Trade Organization (WTO). Agricultural issues will again play a prominent role. While it is too early to identify specific issues facing negotiators, at a broad level much of the agenda is known. Mainly these issues reflect perceived deficiencies in the Uruguay Round Agreement. This article identifies those broad areas of discussion.

Market Access

The language of the Uruguay Round Agreement called on nations to convert non-tariff trade barriers to tariff equivalents and to reduce these barriers by specified percentages over an implementation period. In some cases the calculated tariff equivalents were known to be prohibitive to trade, so exporting nations argued for and obtained minimum access commitments. These commitments were intended to guarantee that at least 3-5% of a market was open to imports. Tariff-rate quotas (TRQ's) have frequently been used to implement this agreement. Under a TRQ a nation sets an import quota. Imports below the quota pay a low tariff, while imports above the quota pay a higher tariff.

Actual implementation of the Uruguay Round Agreement market access rules has been unsatisfactory for many exporting nations for a variety of reasons. The next

round will address some of these complaints.

In the Uruguay Round nations calculated the level of trade barriers from which the agreed to cuts are applied. Within the rules established

“Much of the proclaimed liberalization of agricultural trade has not occurred.”

by negotiators, nations could determine tariff equivalents much greater than the actual barriers imposed. This is called “dirty tariffication” or “putting water in the tariff.” Countries with “water in their tariff” can, should they choose to, raise the tariff and still satisfy their WTO commitments. For example, the European Union agreed to a maximum tariff on wheat of 231 European Currency Units (ECU) per ton the first year of the implementation period. Over the following six years the tariff binding was to fall to 148 ECU per ton. But the actual equivalent of the European Union’s variable levy in the base period was 125 ECU per ton - well below the binding. The European Union is not alone in doing this. Much of the proclaimed liberalization of agricultural trade has not occurred. The upcoming negotiations will try to squeeze the water out of

tariffs by bringing applied and bound tariffs into closer agreement.

One reason for converting non-tariff barriers to tariff equivalents was to make the impacts of such policies clear to everybody. That is called increasing the transparency of the policy. Tariffs have clear impacts on markets and income distribution, whereas, non-tariff barriers tend to hide these impacts. Adoption of tariff-rate quotas in the Uruguay Round to replace non-tariff barriers did not improve transparency. Indeed, it may have made it worse. Tariff-rate quotas can create windfall gains for those who import before the quota is breached and pay the lower tariff. Consequently, there must be a way to allocate the quota, and several alternative procedures are being used. Different procedures create uncertainty about who gains and who loses. In some cases, the right to import a commodity has been given to individuals with no

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desire to import, and there is no expansion of trade.

The next round will try to improve the way TRQ's operate. One item on the agenda will be reductions in above quota tariffs, which are often so high that the new TRQ acts like the old quota it replaced. Also, some effort will be made to raise the quotas to expand the volume of imports subject to lower tariffs. Many exporting nations are unhappy at the multitude of ways quotas are administered, especially when the quotas are administered to block market access. Rules to clarify quota administration will be on the table.

Export Subsidies

The Uruguay Round Agreement imposed quantity and expenditure limits on export subsidies. While that agreement allows some switching between similar commodities, the

rules for export subsidies are stronger than those for market access. Two issues linked to export subsidies will be on the agenda.

One issue is that the export subsidy cuts of the Uruguay Round will be expected to be expanded. While the U.S. Export Enhancement Program remains officially alive, the United States has not used direct export subsidies since the high commodity prices of a few years ago. However, the European Union renewed its use of export subsidies as world prices fell. There will be pressure on the European Union to follow the U.S. example and end export subsidies. Europe will find this difficult to do because it cannot maintain domestic prices above world market levels and dispose of surplus production on world markets without export subsidies.

The other issue concerns the use of export credit guarantees and concessional sales programs. The United States will find



this a difficult issue. The Uruguay Round ignored concessional sales programs, but some exporting nations, like Australia and Canada, are displeased with the heavy use of the programs by the United States and European Union. Recent U.S. concessional sales to Indonesia, Korea, and Russia have fueled the issue with other exporters have complaining about "unfair" U.S. competition in their "traditional" markets. There will be efforts by other exporting nations to eliminate or limit the use of concessional sales programs.

Domestic Policy

The Uruguay Round put domestic farm policies on the negotiating table for the first time, but little serious progress was made in reducing farm subsidies. Although the agreement called for a 20% cut in the aggregate measure of support, nations paying deficiency payments on 85% of a crop's normal area or which had a set-aside program were allowed to exclude those payments from the cuts. This meant that most U.S. and European Union farm subsidies were excluded from the subsidy cuts.

Since the Uruguay Round, the United States has passed the FAIR Act which decoupled payments to farmers from crop production. Decoupled payments are fully WTO legal with no limits on their use. Although the European Union is reducing price supports as part of its Agenda 2000, its farm payments continue to be linked to production. The European program is like U.S. farm programs from 1985 to 1996. There will be an effort to drop the exclusion for deficiency payments in the presence of supply management, and possibly to further cut the allowed farm subsidies. As with export subsidies, in this round the United States can claim the moral high ground because it has already taken these steps. On the other hand, the European Union will be in an awkward position. The recent farmer protest of proposed support price reductions in Brussels illustrates the difficult situation faced by European negotiators.

State Trading

Another area left unresolved by the previous negotiations concerns the role of state trading enterprises (STE's) in world trade. State trading enterprises are government or public agencies with exclusive control over trade by a nation. They come in many forms with very different powers. Some examples include the Canadian Wheat Board and the Japanese Food Agency. They are very common in developing nations which fear being disadvantaged in world trade. When the U.S. Export Enhancement Program was active, the United States notified the WTO that the Commodity Credit Corporation was acting as a state trading enterprise through its control on U.S. export prices and volumes. With the Export Enhancement Program suspended, the United States has withdrawn that notification.

Trading rules established by the WTO are designed to control price distortions established by governments. Such barriers are transparent in that the policy is known. State trading enterprises fit poorly into existing WTO rules because import and export decisions are not clear to

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Editor

Gerald A. Harrison
E-mail: harrison@agecon.purdue.edu
Phone: 1-888-398-4636

Editorial Board

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outsiders. It is hard to play the trade game without knowing the rules beforehand. For example, what barriers face wheat imports into China? This is hard to answer because import decisions are made behind closed doors. This is one reason Chinese and Russian entry into the WTO had been delayed.

Tightened WTO rules on state trading is high on the U.S. agenda for the next round. Some individuals have argued for banning STE's as a WTO legal business form. The United States sees STE's as exercising undue influence on world agricultural trade through discriminatory pricing, undercutting prices, and secret trade deals. The U.S. push to put STE's high on the agenda is very controversial and upsets nations like Canada and Australia which generally share U.S. trade concerns. These nations use marketing boards to export commodities and see marketing boards as legitimate institutions that reflect their historical, cultural, economic, and social experiences. They argue that boards are no more likely to engage in unfair trade practices than the large private exporting firms in the United States.

Technical Barriers and Sanitary and Phytosanitary Barriers

Technical barriers to trade (TBT's) and sanitary and phytosanitary (SPS) barriers have long existed. So long as traditional trade barriers like quotas and tariffs throttled agricultural trade, TBT's and SPS barriers remained low on the agenda. As traditional barriers are being reduced, TBT's and SPS barriers have emerged as major stumbling blocks to further trade liberalization.

Such barriers are WTO legal if used to protect legitimate animal, human, and plant health and safety and not as disguised protection. Separating legitimate health and safety concerns from disguised protection is difficult. The Uruguay Round Agreement attempted to reform the rules on using these barriers by introducing the concepts of scientific basis, acceptable risk, regionalization, and harmonization or equivalence.

Barriers are to have a scientific basis, reflect a risk acceptable to society, to be harmonized or made equivalent across nations, and to allow open trade between disease free regions.

The increase in TBT and SPS trade disputes in recent years illustrates that establishing rules on TBT and SPS barriers will be difficult. Fundamental questions must be addressed before making effective rules. Which nation's science serves as the standard? What happens when scientists disagree on the evidence? For example, is beef treated with hormones safe for human consumption? The U.S. Government and most American scientists say yes. European governments and many European scientists say no. Are genetically modified corn and soybeans safe for the environment and people? Current U.S. testing done by companies producing these products says yes. What if the answer later turns out to be no? Do European consumers have the right to know if the product they are consuming contains genetically modified material or is such labeling a trade barrier? What is an acceptable risk? Does it vary by commodity, by society? Is the U.S. zero tolerance law defensible to the WTO? What are equivalent processes? Is chlorine dipped chicken equivalent to chicken treated in other ways?

These are extremely difficult questions to answer, especially in international trade negotiations. Whereas researchers may disagree on the magnitude of impacts from a traditional trade policy like a tariff, the directions are clear. Such is not the case for TBT's and SPS barriers. By their nature they involve complex and value-laden differences among nations on a case by case basis. Designing workable trade rules will be exceedingly difficult, but they are necessary if nations are to be prevented from undoing previous trade liberalization through disguised protection.



Dispute Settlement

The Uruguay Round tried to improve the dispute settlement process. Under the old rules all parties, including the offending nation, had to agree to a dispute panel's conclusion. Thus, the offending nation could block any decision if it so chose. Now there is a majority rule.

The process has been improved. That more disputes are being taken to the WTO reflects increased confidence in the process. Yet there is dissatisfaction, and there will be efforts to improve the process further. A major concern is that nations use the procedure to delay dealing with an unfavorable ruling.

From the U.S. viewpoint, two critical tests of the new dispute process have exposed weaknesses. Twice the WTO has ruled against the European Union's ban on import of hormone treated beef and its banana policy. Yet those barriers remain.

In the banana case, the European Union changed its import rules, but the new rules violated the WTO rules. Will new rules satisfy the WTO, or will the process be repeated and repeated year after year? The fear is that other countries will copy this strategy. Following an adverse WTO decision a small policy change will be done, a new complaint and panel will follow. Meanwhile, the violation continues.

On hormones in beef, the United States interpretation was that it won and that the ban would be removed. The European interpretation was that it had not lost. Its scientific evidence was not sufficient to sustain the policy, but neither was the case clear for an end to the ban. The European view was that it would restudy the issue to obtain new evidence while leaving the ban in place. After 11 years and two WTO panels, the United States recently moved to impose penalties on European imports in retaliation.

The precise nature of improvements to the dispute settlement process cannot be foreseen. It would not be surprising to see specific time deadlines for decisions and policy changes considered. In U.S. trade legislation there are specific

deadlines for policy recommendations and actions.

Conclusion

The general outline of the agenda for the next trade negotiations can be foreseen. Which issues remain on the table and how they will play out cannot be known.

A critical question raised by many in agriculture is whether the Clinton Administration's lack of fast track negotiating authority is a serious handicap in the upcoming negotiation? The United States would be in a stronger negotiating position if it had the authority to make creditable deals. The lack of fast track

authority at the present time is not a serious problem since the negotiations have yet to begin. Because there will be no substantive progress in making deals until fast track authority is granted, such authority will become more urgent as the negotiations proceed.

Indiana Farm Management Tour

This tour to encourage and develop a high level of management competence in farmers.

Tuesday, July 6

1) Frank and Beth Bender Farm - Posey County - 1:00 p.m.

The Benders are now farming approximately 1,500 acres following a 1988 start. White corn and food grade yellow corn are the primary corn crops grown with wheat and soybean seed crops.

2) Allyn Family Farms - Posey County - 3:45 p.m.

They have 3,300 acres of corn, soybeans, and wheat. The farm features a modern grain handling system with 8,400 bu. per hour of unloading capacity, high efficiency drying, and 175,000 bushels of storage capacity.

3) Tuesday Evening Program - Vanderburgh County 4H Center, 7:45 p.m., 8:00 p.m. -

"Changes in a Community When a Toyota-Type Plant Is Built," John Huie, Purdue Ag Economist, and local leaders.

Wednesday, July 7

4) Rexing Farm - Vanderburgh County - 8:00 am. Interview at 8:00 am.

Ray Rexing and his sons, Kent and Brian, produce milk, beef, pork, forages, corn, wheat, soybeans, and other products on about 1,800 acres. The farm is also very near the new Toyota plant in southwest Indiana.

Concerns and issues associated with the encroaching development will be the topic of one discussion with Ray Rexing.

5) Charles and Judy Schmitt Farm - Gibson County - 10:00 am.

Charlie, Judy, and Kurt Schmitt, along with other family members, operate this 1,650 acre farm. Crops include white and yellow corn, soybeans, and wheat. Also, 350 Angus steers are finished, straw is sold to a local mat factory.

6) Lunch at Haubstadt Community Park, near Schmitt's - 12:00 noon.

Food provided by Four County Pork Producers. Limited supply of free lunch tickets available at earlier tour

sites. Commodity Price Outlook by Purdue's Chris Hurt after lunch.

7) Obert Dairy and Crop Farm - Gibson County - 1:30 pm.

Balancing the demands of dairy and crops on a family farm can be an ongoing challenge. The Obert family meets the demands through innovative management of part-time labor, progressive management of dairy cattle and crops, and a carefully planned business structure.

For a detailed flier, call Howard Doster, 765-494-4250, toll free, 1-888-398-4636, and ask for Howard Doster's office, or E-mail: <Doster@agecon.purdue.edu>.

New Ag Econ Faculty

Frank Dooley joined the Agricultural Economics Department at Purdue in August 1998. He is working closely with undergraduate students and the Center for Agricultural Business. He will be teaching one of the courses in the new EMBA program. He recently received an ARP grant to study changes in the grain elevator industry resulting from the introduction of value-added grains.

He is the present chair of the Resident Instruction committee of the American Association of Agricultural Economics. He was named Outstanding Educator of the Year in 1997 by the Western Agricultural Economics Association. He has served on the Executive Council of the Mountain Plains



Frank Dooley

Consortium, was a member at large of the Transportation Research Forum National Council, and on a National Academy of Sciences committee that studied workers compensation in the railroad industry.

Marketing Value-Added Grains and Oilseeds

Jennifer Vandeburg, Graduate Student; Joan Fulton, Assistant Professor; Frank Dooley, Associate Professor; and Dirk Maier, Associate Professor of Biological Engineering

Value-added grains are grain products that have been enhanced, through genetic manipulation or special handling, to provide greater value to the end-user than their commodity counterparts. While some of these products have always existed, an explosion of new products has occurred in recent years. Examples of value-added grains that have received considerable attention recently are high oil corn, waxy corn, tofu soybeans, and high oleic acid soybeans.

In 1991, Tom Urban, then CEO of Pioneer Hybrid International, discussed a new trend in agriculture—industrialization. He noted, as have other writers, that recent and ongoing changes in poultry, pork, and cattle production illustrate industrialization. Perhaps foretelling the move to value-added grains, he also pointed out that “It is, in fact, the coming change in grains and oilseeds production patterns which is perhaps the least recognized, yet the most significant in the long run” (Urban, p. 4).

This article describes the life cycle of a value-added grain, identifies marketing issues associated with value-added grains, addresses issues associated with the physical and logistical needs of the market channel, and finally, closes with a discussion of the potential implications, for the market channel, of widespread use of value-added grains.

Life Cycle of a Value-Added Grain

Niche Markets

Most value-added grains start with very small production, serving a niche market, sometimes only one user. They tend to be produced in a limited geographic area, centered around the user, or the first point of sale. Because many of these crops involve a high level of yield or production risks, participating growers

tend to be innovators and demand a high premium. These crops are grown under contracts, for acres rather than bushels. While the grower may receive a sizeable premium, other participants in the program, like the seed supplier, the grain handler, and the processor may operate at a loss on this venture in the initial start-up phase. The contract may also require on-farm storage to avoid comingling during the marketing process. These contracts are referred to as “buyer’s call” contracts because the buyer expects delivery upon request. Growers should expect a high level of involvement in monitoring and consulting by the coordinating contractor. In particular the genetics may be limited to one variety.

As technology develops, super high value crops may be possible, such as those containing pharmaceuticals. Super high value crops may never leave the niche market phase, however, some will evolve to the widespread contract production phase.

Widespread Contract Production

Value-added crops that prove viable will experience expanded geographic production and enter into the widespread contract production phase. Dispersing production geographically reduces the contractor’s risk of total crop loss due to adverse weather. The agronomic risks for growers are also reduced as production experience expands and the premium is reduced from the niche market phase. Growers will still tend to be early adopters who are less risk averse than the average producer. Seed suppliers, grain handlers, and processors, who previously operated at a loss, now expect to see a positive return. The contract will probably still be for acres of production, but may start including a bushel goal. Harvest delivery may now be possible, but on-farm storage will be required in many cases. The

available genetics will be limited to a list of approved varieties. While monitoring by the contractor will still be important, the intensity will be reduced compared to the niche market phase. Many value-added grains may stop here and stay at this volume of production.

Enhanced Commodity

The final phase of the life cycle of a value-added grain is the enhanced commodity phase. As value-added crops gain wider acceptance, the production area will expand. In some regions they will become “third commodities,” with production contracted in bushels and with harvest delivery available. Waxy corn has reached this status in central Indiana, since there are so many users in the region. As the agronomic and marketing risks are reduced, the premium to growers will shrink. The approved genetics list will expand to include a wider selection for growers to choose from. In addition, the monitoring by the contractor will be systemized.

Challenges in the Market Channel

A commodity market system relies on open market transactions to produce and quickly move large quantities from the grower to the end-user. As the production and use of a value-added grain increases, an entirely different mindset for all participants involved in the market channel is required. While the high value of these grains and oilseeds derives from specific quality traits, exact knowledge of those traits secures that value. It therefore is necessary to preserve the identity of the crop through physical separation and special handling. An essential additional part of identity preservation is maintaining the integrity of the information about the product. This information must be transferred downstream to the producer and upstream to users. All this

means extra time and investment in relationships and infrastructure.

Identity preservation (IP) starts with planting the right seed and continues all the way through transport to the end-user. While important throughout the system, IP is critical at any point where grain is transferred, such as from the producer to the grain elevator or from the elevator to the processor, because the risk of contamination multiplies at that point. Identity preservation is accomplished through careful testing and handling. The quality of the grain must be assessed, and then it must be stored separate from other products. Handling the grain may include added services such as closer management of grain deliveries, cleaning out dump pits, and specialized handling equipment.

The challenge for transferring and storing these crops is that value-added handling is an entirely different task than the one for which most grain facilities were designed. Most facilities were set up to quickly ship large amounts of grain that have been blended to an average quality. Value-added handling requires smaller grain bins, slower handling equipment to guard against kernel damage, and smaller shipment volumes. This may mean added investment for on-farm storage, extra equipment at the elevator, or renovation by the processor to handle smaller lots of raw material.

Value-added grains also require a change in how information is transferred along the channel. There is

simply more information about a specific bushel of grain in terms of volume and precision. In addition to the traditional data like moisture content and test weight, information about genetic identity, chemical composition, and other quality traits* are now known. Acquiring compositional data, previously a severe stumbling block to the marketing of these products, is now faster and less expensive with the use of near infrared technology. To have value to the end-user and the other players in the market channel, the integrity of this information must be maintained throughout. To complicate things more, all this data must be transferred quickly.

At all stages of the market channel, there is a need for greater personnel training. All participants need to understand why this product receives different attention than commodity grain. The increased level of information will require better communication skills. Because much of this information will be collected and transferred electronically, training in computer-based technologies and skills will also be crucial.



Risks and Returns

One of the biggest questions being asked is "How do we share all this added value?" This refers to how the participants in the market channel allocate premiums. Each step of the market channel needs to at least cover its cost of doing business. Current grower contracts tend to use a formula of commodity price plus premium. For example, one formula for the final price on waxy corn is the corn futures price plus 25¢ minus local basis** (Clouse). Some products like high oil corn (HOC) use a graduated premium, with a greater reward for higher oil content.

Competition implies that premiums may vary among buyers. Some enhancements, like HOC, enhance grains' performance in a traditional use. For example, compared to corn (#2 yellow) HOC is an enhanced energy source in rations. Other modifications, such as corn modified to

make components of plastic, soybeans with specific industrial use chemicals in them, or grains which include pharmaceuticals in their makeup, will create nontraditional uses for a grain or oilseed, necessitating a separation of pricing from the price of the base commodity***. If these crops are truly different, then their prices should not be affected by the supply and demand situation for the commodity. Likewise, their prices should be able to shift if there is change in the value-added crops' supply or demand. One concern related to decoupling these prices is the loss of hedging capability. But if these are not related, crosshedging should not be viable (the point is they generally are related). Some other arrangement for risk management will need to be made. A possibility could be a risk-sharing arrangement within the grower contract.

To market value-added grains, the entire market channel must work closely together. One player could hold the whole process hostage by refusing to work with everyone else. That is why communication and coordination are important. There may emerge a role for a "coordinator" who assures an orderly marketing process through close communication. The coordinator may also have a role in allocating returns among participants.

Allocation of returns may be influenced by both the functions provided and the amount of risk taken. Producers face yield uncertainty. Handlers bear quality risk in handling and storage. Processors face contract risk if sufficient volumes are not produced to meet end user commitments. Finally, there is also risk to facility investments and research that does not prove to be economically feasible.

Requirements for Growth

An increase in the cultivation and use of value-added grains and oilseeds requires growth in five areas: investment, communication, relationships, commitment, and trust.

- Investment—Firms within the market channel are required to

* Quality traits may include information about special handling or component (such as oil or protein) content.

** This premium has increased from 18¢ in recent seasons, due to an increase in use of waxy corn for the 1999 season at Staley's corn processing plant.

*** Currently, most value-added grains and oilseeds are priced using the base commodity price plus premium formula (Kalaitzandonakes and Maltsbarger). Eventually, the decoupled pricing will develop as the use of grain with a specific modification diverges from traditional grain usage.

invest in the physical and human capital of the system. New testing instruments, storage capacity, and handling equipment require capital outlays. New systems require heightened employee training. In addition, greater research expenditure in areas of markets, genetics, agronomics, and processing is required as the market channel becomes more end-user responsive.

- **Communication**—Because specific attributes make value-added grains valuable, the participants in the supply chain need to improve how they share information. Communication also needs to be enhanced throughout the system. Price can no longer be the only way to do this. Accurate information about when, where, and how a crop is to be delivered can be just as important as the chemical composition of the grain itself.
- **Relationships**—All the participants in the supply chain need to work as a team toward a common goal. In the current open market

system each participant is working toward different goals. A crop is grown and pushed through the market channel. This needs to shift to a “pull through” system where all the players along the market channel listen to what the end-user wants and work toward that common goal.

- **Commitment**—All the players must make a commitment to the system. They must all believe that they will be better off united. These systems will have a larger long-term benefit than short-term. Each system participant must be willing to endure difficulty to attain the system’s goals
- **Trust**—Trust is also essential. One player’s success depends largely on the others doing their part. They need to be able to rely on each other. One player can hold up the entire system once it is in place. All system participants must have the assurance that the other players are committed to the mutual goals of the system. Only then will each

player be willing to take the investment risks needed to establish and nurture the system.

Summary

These components will come together to form a different, non-commodity based market system as value-added grains and oilseeds gain market share. Investment is needed to increase the communication throughout the system. The communication helps improve the relationships that will then make it possible for the participants to commit to the system. The final key, stemming from that commitment, is trust between players that their teammates are equally committed and striving toward the same goal—to meet the needs of the end-user.

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Deciding to Switch to Narrow-Row Corn

Alan Hallman, Graduate Assistant and J. Lowenberg-DeBoer, Professor

Deciding to switch to narrow-row spacing in corn is not just about increasing yield. It is about balancing costs and benefits of switching to narrow-rows. Whether switching increases profits depends on location, current agronomic practices for both corn and soybeans, changes needed to harvest narrow-row corn, the resale value of narrow-row equipment, and other factors. The purpose of this study was to estimate the potential profitability of switching to either 20-inch or 15-inch row corn. This article focuses on expected profits from narrow-row corn, but it is important to note that narrow-row corn may increase technology risk.

Many factors influence the profitability of narrow-row corn. Yield response to narrow-row spacings varies regionally. Most studies show a greater yield response in the northern Corn Belt. Root worm in first year corn is a growing problem in parts of the eastern Corn Belt. The cost of corn root worm insecticide per acre increases sharply with narrow-rows, doubling as rows go from 30-inch to 15-inch row width. Some farmers now have separate planters for corn and soybeans. Costs can be reduced if both corn and soybeans can be planted with the same planter. This can have implications for the time of planting and the number of acres farmed.

If a narrow-row combine breaks down, it may be difficult to find a neighbor or custom operator to complete the harvest, and if narrow-row corn is not widely adopted, the narrow-row cornhead may not have much resale value.

(Lowenberg-DeBoer and Hallman (1998) provide fuller discussion of risks related to narrow-row corn).

Yield Data

The study used partial budgets to estimate the expected annual profits from switching to narrow-row corn. The focus is on long-term costs and benefits. The short-term transition costs of making the change are not included. A complete summary of the data and methods is available in

Lowenberg-DeBoer and Hallman (1998).

A key question is corn response to narrower rows. Much data is available from university and industry studies. In an effort to summarize this data, publicly available data was pooled from across North America. This data came from scientific publications and the INTERNET. The data was grouped into the regions illustrated in Figure 1.

Studies tested a wide variety of row spacings, and it was not clear that small changes in row spacing (e.g., 22 to 20 inch or 20 to 15 inch) had much impact, so data was grouped into 30-inch and narrow-row categories. The 30-inch category includes row widths from 29.9 to 31.5 inches. The narrow-row category includes row widths from 25.6 to 10 inches, with an average of 18.1 inches. There are 140 data points, each with a 30-inch and narrow-row component. Similar results to those using the public data set were obtained by using a data set from Pioneer Hybrid, containing 1322 data points, but a smaller geographical reach.

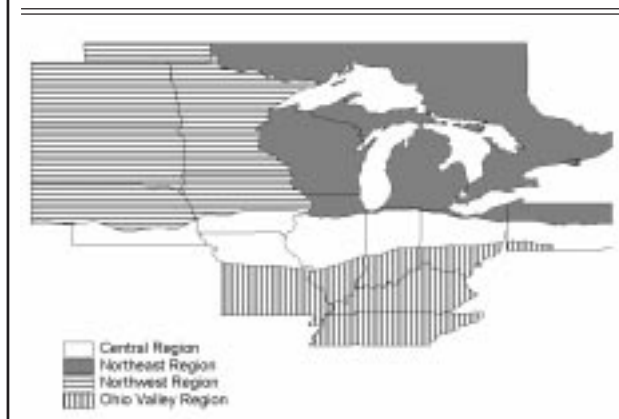
The average percentage change in yield when going to narrower rows is around 6% in the northern Corn Belt, but only 1% to 2% in the Central or Ohio Valley Regions (Table 1). This is consistent with average yield differences identified by other researchers. It should be noted that the publically available data may overestimate the yield response to narrow-rows because of reporting bias. The scientific review process tends to encourage the reporting of trials with significant (i.e., larger) differences and discourage reports in which no significant differences were found.

Machinery Costs

Equipment costs vary by size of equipment and acreage covered. To make the analysis concrete, the focus

** This method estimates the annual payment that would be needed to exactly pay for the equipment assuming compound interest. The annual payment estimate combines depreciation and opportunity cost of capital.*

Figure 1. Regions used to group narrow row corn data.



was on the type of equipment used on larger commercial farms, moving from 16 30-inch rows to 24 20-inch rows or 32 15-inch rows for planting 900 acres of corn. Machinery costs would probably be somewhat higher for smaller equipment on smaller farms. The 20-inch row comparisons assume that the producer has a planter used only for corn. Average price of new equipment from three major manufacturers was used to estimate 20-inch and 30-inch row costs.

The 15-inch row comparisons assume the farmer currently plants corn in 30-inch rows and soybeans in 15-inch rows with the same planter equipped with "row splitters." When planting corn in 30-inch rows, only every second planter unit is used. For 15-inch row corn the producer simply uses all the planter units for corn, just as is done for soybeans. The equipment required in this case is a 15-inch row cornhead, narrow tires and frame extensions for the combine. The cost of a 16-row 15-inch cornhead was obtained from

Clark Machine, Howard, South Dakota.

A sinking fund* approach was used to annualize equipment costs. Original cost was estimated at 85% of manufacturer's list price. A 10% interest rate was used. The planter and corn head were given a useful life of 10 years, and narrow tires and frame extension five years. Estimated resale value and repair costs were based on the number of years and hours of use. Insurance and taxes were also included. It was assumed that the current combine could support a somewhat heavier narrow-row corn head.

For the case of the corn only planter used on 900 acres, the switch from 30-inch row to 20-inch row requires an investment of about \$25,000. Annual equipment costs increase about \$6.54/a if the cornhead can be sold at the end of 10 years.

For the-15 inch row case, no additional planter investment is required, but the cornhead costs about \$17,000 more than a 30-inch

Table 1. Yield Levels and Changes Due to Narrower Rows by Region

Region	30-inch Row Average	Percentage Change with Narrower Rows
	-- bu./acre --	----- percent -----
All	151	3.4
Northwest	145	5.9
Northeast	158	5.7
Central	148	2.3
Ohio Valley	155	1.2

head of the same width. The additional investment required is about \$20,000, and annual equipment costs increase about \$5.97/a. The increase in corn head and planter costs for the 20-inch case is greater than the increase in the costs of the corn head in the 15-inch case.

Resale value of the cornhead has only a small impact on annualized costs. If the narrow-row corn head is used 10 years and junked instead of being sold or traded in for the average resale value, the costs of switching to narrower rows increases by only \$0.85/a.

Other Costs

Corn root worm insecticide is applied per linear foot of row. As row width narrows the number of feet of row per acre increases. Following insecticide label rates, the analysis assumed that insecticide use increases in proportion to the increase in row length per acre. For example, for 20-inch rows, the row length and insecticide increase by 50%. Insecticide label rates sometimes include a per acre limit on the amount of insecticide to apply. It may be necessary to change insecticides because for some products the amount required in narrow-rows exceeds per acre limits. At average 1998 prices, the increased insecticide cost would be \$7.97/a for 20-inch rows and \$15.94/a for 15-inch rows.

Corn and soybean prices were USDA 1988-1996 averages for a state in each region. Fertilizer costs for increased yield was charged at crop removal rates. Additional drying and hauling were included. Plant population and seed costs were assumed to be the same for both 30-inch and narrower rows.

Results for 20-inch Rows

For farmers that have a corn only planter and do not need insecticide on first-year corn, the switch to narrow-row is modestly profitable in the Northeastern and Northwestern regions (Table 2). In other areas the yield increase is not enough to pay for the added equipment costs.

When insecticide is required on first-year corn, narrow-row corn has only a slight positive return in the Northeastern region, probably not enough to compensate for the costs of making the transition and the added risk. Most of Indiana is in the Central and Ohio Valley regions where average yield benefits are not enough to make 20-inch row corn profitable.

Results with 15-inch rows

For farmers who already have a corn and soybean planter and do not need insecticide on first-year corn, the switch to narrow-row is profitable in the Northeastern and Northwestern regions (Table 3). It is about breakeven in the Central and Ohio Valley regions, which includes most of Indiana. Because of the doubling of insecticide cost in 15 inch rows, narrow-row corn is unprofitable for continuous corn or when root worm problems occur in first-year corn.

Conclusions

This study indicates that for farmers in the northern Corn Belt who do not need insecticide on first-year corn, narrower rows are a potentially profitable technology. Because of the increased insecticide cost with narrower rows, the technology is not currently profitable for those who use insecticide on first-year corn or

grow continuous corn. Given publicly available data on yield, narrow-row corn does not appear to be profitable in the central and southern Corn Belt, including most of Indiana.

This analysis looked at costs for large-scale corn growers currently using 16 row 30-inch equipment. Narrow-row costs for smaller equipment would be slightly higher. Benefits to narrow-row corn for smaller operations are expected to be slightly less than those estimated, but the general conclusions would be the same.

The equipment scenarios used for this study focus on those which change only corn production practices, either by changing row width on a corn only planter or by using an existing soybean planter for corn. There are cases in which soybean row width might be affected by the planter choice. For example, a producer might decide to switch from a 30-inch row corn only planter and a 7.5-inch row soybean drill to a single 15-inch row planter for both crops. When soybean row width is widened, the potential reduction in soybean yield must be factored into the profit estimate.

One potentially important limitation of this study is that it did not include the possibility that more rapid canopy closure in narrow-rows would improve weed control and lower herbicide costs. This aspect may be particularly important with the new herbicide tolerant corn hybrids.

Growers who do not decide to move to narrow-rows now should regularly revisit that decision. Technological change may quickly alter the economics. For example, a genetically modified root worm resistant corn could eliminate the need for insecticide and make narrow-row corn profitable in northern Corn Belt areas with root worm problems in first-year corn.

References

Lowenberg-DeBoer, J. and Alan Hallman, "Cost, Average Returns and Riskiness of Switching to Narrow row Corn," Symposium on Exploring New Crop Management Systems, American Society of Agronomy Annual Meeting, Baltimore, October, 1998.

Table 2. Change in Corn Net Returns Moving from 30-inch to 20-inch Rows

Region	With Insecticide	Without Insecticide
	----- \$/acre -----	
All	- 4.83	3.14
Northwest	- 5.90	2.07
Northeast	0.77	8.74

Table 3. Change in Corn Net Returns Moving from 30-inch to 15-inch Rows

Region	With Insecticide	Without Insecticide
	----- \$/acre -----	
All	- 12.23	3.71
Northwest	- 13.30	2.64
Northeast	- 6.63	9.31

Joint Ventures and Strategic Alliances Help Local Farm Supply and Grain Marketing Cooperative Remain Profitable*

Joan Fulton, Assistant Professor

The business of agriculture is changing rapidly in a process that many are referring to as the "industrialization of agriculture." This is creating numerous challenges for locally owned farm supply and grain marketing cooperative and in many cases threatening their very survival. As local cooperatives struggle, so do the rural communities that they are a part of because these businesses represent a significant part of the local economy. This article reports on how local cooperatives in eastern Colorado are using joint venture and strategic alliance business agreements to deal with the challenges resulting from the industrialization of agriculture and to maintain viable businesses in their respective rural communities.

Challenges for Locally Owned Cooperatives

The challenges that local cooperatives face as a result of the industrialization of agriculture can be categorized into the following areas.

Economies of Scale: Scale economies in virtually all areas of agribusiness are creating a distinct competitive disadvantage for local cooperatives. The nature of agribusiness is changing so that efficiency requires a large-size operation in order to achieve a low-average cost of production.

Changing Government Regulation: Many farm supply firms are

having to make substantial capital investments to construct new storage facilities for fertilizers and pesticides to meet changing Environmental Protection Agency standards.

Inventory Management: As agriculture becomes more industrialized there is increased pressure to achieve maximum efficiency at all stages in the agribusiness system, including inventory management. The challenge for grain marketing and farm supply cooperatives is how to serve the needs of their membership while controlling the costs associated with maintaining inventory and storage facilities.

Investment Portfolio: Many local cooperatives are finding it necessary to follow a portfolio investment approach and expand beyond their traditional business. The advantage of this approach is to provide diversity for the business as well as an income flow from other sources.

Technical Expertise: The industrialization of agriculture is creating a much more complex environment for all agribusinesses, and technical expertise is becoming more important for business survival.

Merger: The pressures noted above are leading to consolidation of our cooperative sector. In the decade from 1986 to 1996 the number of marketing and farm supply cooperatives in the United States decreased from 4237 to 3415, or about 20%. Locally owned cooperatives are simply finding it impossible to maintain a viable business entity and are being forced to close or to merge with another business. These mergers and consolidations are in turn placing pressure on rural communities across the country.

Opportunities from Joint Venture and Strategic Alliance Agreements

In response to the challenges of today's marketplace, many businesses, including locally owned grain marketing and farm supply cooperatives, are utilizing joint venture and strategic alliance business agreements. For purposes of clarification the distinction between a joint venture and a strategic alliance is the degree of formality associated with the agreement. Strategic alliances are more informal agreements, while joint ventures are more formal and often involve the creation of a new business entity (e.g., a new cooperative, a partnership, or a limited liability corporation).

In the remainder of this article I report on the results of a research project, funded by Rural Business, Cooperative Service, USDA, where managers of 20 locally owned cooperatives involved in grain marketing and farm supply were interviewed with respect to their involvement in joint venture and strategic alliance agreements. The cooperatives were all located in the high plains region of Colorado east of the Rocky Mountains, and the interviews took place in January 1995. All 20 cooperative managers reported at least some use of joint venture or strategic alliance business agreements. The extent of usage varied from some managers reporting one or two informal agreements that they had with neighboring cooperatives to others who administered several formal business agreements with other cooperatives. The types of business agreements that the managers reported are discussed below according to the six challenges identified in the previous section. Although the research involved local cooperatives in Colorado, the research conclusions concerning opportunities from these

* An earlier version of this article was entitled "As Agricultural Industrializes, Local Supply and Grain Coops in Colorado Remain Profitable Through Joint Ventures and Alliances" published in *Rural Cooperatives*, Vol. 65, #3, May/June 1998 at page 19.

business arrangements hold for cooperatives in any region.

Economies of Scale

Farm supply businesses can often obtain volume discounts on input purchases if they are large enough. Many local farm supply cooperatives, however, are not large enough to take advantage of these volume discounts. Managers reported working together to solve this size problem. By purchasing inputs, such as fertilizer, diesel, petroleum and fence posts, jointly with neighboring cooperatives they were able to obtain the volume discounts and lower their input costs.

Grain marketing cooperatives often rely on rail transportation to move the grain from the elevator to the next stage in the supply chain. Given the lack of competition that is an inherent feature of the rail industry, small cooperatives are at a disadvantage when it comes to negotiating rail rates. Several grain cooperatives in northeastern Colorado that were adjacent to one another along the same rail line found a way to at least partially overcome the imbalance of market power that the railway held. By forming a joint venture marketing agreement through which they agreed to ship 100 cars of their main commodity, they improved their bargaining position and were able to negotiate substantially better transportation rates.

Business size is also important in the efficient processing of grain into feed. Cooperatives reported that through strategic alliances they were able to obtain the necessary volume to lower unit production costs and thus provide the associated goods and services to their members.

Several of the cooperatives reported involvement in a joint venture agreement that involved joint ownership of petroleum storage facilities at the pipeline. The managers identified that their business was not large enough to justify the investment on its own—but together with the other cooperatives they achieved the critical size.

Changing Regulations

Some services that have traditionally been offered by farm supply cooperatives, such as fertilizer sales and customer application, and liquid propane, are becoming increasingly expensive for small businesses to offer. This is, in part, due to changing government regulations aimed at environmental protection. Several of the cooperatives reported that when they formed a strategic alliance and worked together they had a large enough customer base to offer the services.

Inventory Management

Effective inventory management is important in controlling costs for all businesses, including local cooperatives. Cooperative managers identified that informal strategic alliances with neighboring cooperatives, allowing them to exchange products at cost, was an effective way of dealing with the challenge of keeping inventory costs low while also satisfying member needs. An example that one manager gave us was finding a specific size of tire for a farmer so that he/she could get back to field work as quickly as possible.



Investment Portfolio

As cooperatives looked to outside investments to expand their portfolio, they often found that joint ventures involving ownership of businesses such as convenience stores, tire centers, and integrated hog operations was the way to make the project feasible.

Technical Expertise

Technical expertise is vital to the success of any business and is becoming more important as the business of agriculture increases in complexity. Several of the local cooperatives in this study overcame the problem of not being large enough to afford to hire an individual with expertise on Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) compliance issues by sharing

one employee. Another example of sharing an employee with specific technical expertise was in grain merchandising education. In addition, several of the cooperatives reported taking advantage of technical expertise offered by the regional cooperative, including arranging for transportation of grain with the railway and market surveys to evaluate the feasibility of new investments.

Mergers

Many of the managers commented on the merger pressures that local cooperatives are facing today. There was universal agreement that mergers of local cooperatives have negative effects due to direct loss of business to the local community. In addition, mergers often result in members of one community feeling like they “lost” their cooperative to the other community. The managers repeatedly reported that the joint venture and strategic alliances had allowed them to remain independent local cooperatives and avoid mergers. Some of the managers indicated that a merger with another local cooperative would most likely be inevitable. They were quick to point out, however, that the problems noted above would be greatly reduced because the joint venture and strategic alliance agreements that the businesses are currently involved in were really a stepping stone to a formal merger.

Factors Contributing to the Success of Joint Venture/Strategic Alliance Agreements

Given that joint venture and strategic alliance business agreements can be beneficial for both the cooperatives involved and for the rural communities that they belong to, it is important to identify the factors that make the agreements successful. The determination of these factors was a major component of the research project described earlier. The first component of the research involved developing hypotheses concerning the success factors from the theory of behavior and strategy. Then the hypotheses were tested with the information obtained from the interviews. The managers were asked to

identify the factors that lead to the success or failure of the joint venture and strategic alliance agreements. The managers' responses corresponded directly with and confirmed all of the original hypotheses. From the hypotheses and empirical evidence it can be concluded that a joint venture or strategic alliance will be more successful when the following factors exist.

- The cooperatives that are involved are committed for the long run.
- The agreement includes some punishment for defection by cooperatives.
- All of the cooperatives are financially sound.
- The benefits and costs of the agreements are known and advantageous.
- There is a small number of homogeneous cooperatives.
- There is open communication among the managers.
- There is mutual respect and trust among the managers.

The managers also identified some factors important to successful agreements that did not directly

correspond with the original hypotheses. They noted that joint venture and strategic alliance business agreements will be more successful when they involve:

- People who work well together,
- Business partners who do not intrude on the business territory of other partners,
- Business partners who stay involved in the business agreement,
- Managers who delegate decisions to those in charge of operations,
- Business partners who are able to keep their egos in check,

- Business partners who take the time and effort to educate new managers and new board members about the value of the agreement,
- Contracts that delineate the details and enforce obligation by the business partners, and
- Good feasibility studies so the business partners know what to expect.

Conclusions

Joint venture and strategic alliance business arrangements have a number of positive effects. They allow the business to remain alive, provide an effective transition if mergers are the end result, and keep the rural community viable.

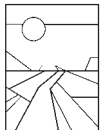
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