Chapter 11
Policy Options for **Enhancing Grain Quality**

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Grain quality is influenced by numerous highly interdependent features of the U.S. grain marketing system, including variety development, production, handling, and merchandising. Trade throughout the system is facilitated by a set of grain standards, and those involved in the market channel respond to incentives and disincentives established for quality characteristics. Much of the policy debate on U.S. grain quality has focused on grain standards, but they are only one of many policy and regulatory alternatives that influence quality. Quality must be thus viewed as part of an integrated system focused on delivering the optimum quality for each domestic and foreign user. The interdependence of the system means that more policy alternatives exist than are traditionally considered and that changes in any one part of the system will have impacts elsewhere.

The first section of this chapter on policy alternatives briefly describes the problems identified during this assessment. The second section discusses the interdependence of the grain system, and identifies a number of policy alternatives and their implications.

SCOPE AND DIMENSIONS OF PROBLEMS

The system for marketing grain in the United States has a number of important characteristics that affect quality. The handling (including export) and transport industries are highly competitive, with relatively limited government intervention. One important principle throughout the system is decisionmaker sovereignty: Producers plant varieties that are perceived to be in their best interest; users (domestic and importers) specify and purchase qualities, given a range of alternatives and prices, that are in their interest; handlers and exporters condition and move grain in their own interest. Each decision assumes the sovereignty of the individual decisionmaker and is based on incentives and disincentives reflected in market premiums and discounts for quality characteristics.

fundamental Advantages of the U.S. Marketing System

In comparing the grain systems of other exporting countries (see ch. 10), several fundamental advantages of the U.S. marketing system are clear in addition to those discussed in chapter 2. At the risk of simplification and with the intent of being general, five broad advantages are identified that encompass several others.

1. Efficiency

The U.S. marketing system performs a number of complex functions—assembling, handling, conditioning, and allocating different qualities to domestic buyers in many locations for export from a multitude of ports. Indeed, the quantity of grain produced, the many differences in qualities produced at different locations, and wide-ranging locations of end-users and ports all mean that the U.S. marketing system is more complex and performs more challenging functions than the systems of any other exporter. Yet the grain handling and transport system is more efficient than that of nearly all other countries. Efficiency is used here in the context of cost (or inputs used) in performing the necessary marketing activities. Efficiency and competition assure lower marketing margins and higher prices to producers.

20 Productivity Growth

Plant breeding in the United States is relatively unfettered, compared with other coun-

tries, in terms of regulations over variety development and release. Success of a variety is ultimately determined by the market for seed stocks. Producers make choices in response to market incentives. Where comparisons are appropriate (e.g., in wheat), productivity growth as measured by yield exceeds that of most other exporting countries, with the exception of France. Productivity differences are affected by a multitude of factors including environment, soils, other inputs, relative prices, institutions, and policies. Thus it is impossible to attribute yield differences to the institutional environment affecting varieties, but growth rates are influenced by variety release procedures.

3. A Wide Range of Qualities

Compared with other countries, a wider range of intrinsic qualities is available in the United States, particularly for wheat. This is obvious given the class differences in wheat, which are facilitated by production regions of differing environments and soils. There is also a wider range of physical and sanitary quality in the United States. Although this is an advantage in that more alternatives are available to buyers, some at lower costs, it maybe viewed as a disadvantage in the sense that "reputation" is affected. The uniformity problem discussed later in this chapter is a direct result of the multitude of qualities available. In addition, given the lack of controls in the system, the multitude of qualities requires expertise on the part of importers if they are to fully benefit from the wide range.

4. Grading and Inspection System

The grading and inspection system in the United States provides grade determination by an independent government agency (i.e., ***one*** not having financial stakes in the transaction). The factors and limits in factors in the grade standards are relatively stable across crop years—e.g., No. 2 corn does not change from year to year. Similarly, the definition of No. 2 Hard Red Winter wheat does not change in the grain standards, although intrinsic differences not measured in the standards may change. This is not necessarily the case in exports from other countries. Major changes cannot be implemented in less than a year after they are mandated. Some other exporting countries adjust factor limits with each crop year.

5. Market-Determined Premiums and Discounts

In all countries, premiums and discounts and/or regulations are used to provide quality incentives to market participants. Those in the United States act through the interaction of the supply and demand for measurable quality characteristics, i.e., the market for quality characteristics. Consequently, values of quality characteristics in the United States perhaps reflect the true values better than do the premiums and discounts administered by government agencies of several other exporters, with the notable exception of France. Efficient determination of these price differentials is important because these essentially allocate grain across end-users and provide signals throughout the production and marketing system. Through these differentials the system responds to needs of the market.

Problem Areas

This assessment identified a number of important general problem areas that must be considered when discussing policy alternatives.

Genetics and Variety Release

An inverse genetic relation often exists between yield and important intrinsic quality characteristics in each of the major grains. In the case of wheat, this relationship is well recognized between yields and protein quantity, and a similar situation exists in corn and soybeans. Breeding programs generally aim to improve yield and disease resistance and satisfy apparently desirable intrinsic quality goals. In the case of corn, breeders have always sought to increase yield and improve harvestability, with intrinsic quality not being a priority. In many cases yield is emphasized because intrinsic quality characteristics, though important,

are not measured in the market. Incentives therefore are not transmitted through the market as readily as those associated with agronomic characteristics such as yield, disease resistance, and harvestability.

Individual breeders or their institutions exercise tremendous discretion regarding release of varieties, However, this discretion is tempered by the market system, which determines the success of any release. Market efficiency requires measurement of relevant intrinsic quality characteristics, which is absent in many cases. For example, a variety with lower yield but an improved intrinsic characteristic (e.g., bake test) that cannot be measured in the marketing system would fail to survive in the seed market. Current variety release procedures are not applied uniformly across States (or firms, in the case of private breeding) or over time. No effective national policy on variety release assures uniformity in application of release criteria. In the case of wheat, in which public breeding is more important, the State Agricultural Experiment Stations maintain variety release procedures that are in turn guided by the Experiment Station Committee on Organization and Policy. Individual States may and do vary from this policy. Ultimately a particular class of wheat, corn, or soybeans produced in different parts of the Nation may differ in intrinsic quality.

Grain Standards

The current U.S. grain standards have four important limitations:

1. they create incentives for practices inconsistent with good management and efficiency;
2. they fail to identify many of the characteristics related to value in use;
3. they fail to reward producers and handlers for improved drying, harvesting, handling, and variety selection; and
4. grade limitations on many factors are arbitrary, do not always reflect real differences in value, and in some cases are not consistent with statistical principles.

No standard can be perfect, and any revisions must consider trade-offs. To move toward an ideal system, changes in grain standards should focus on grade-determining factors, non-grade-determining factors, and definition and measurement technology for official criteria. (Each of these, as well as their interrelationship, is described inch. 8.) Such a system would entail minimal interference yet allow for improved efficiency in the market.

Buyers' Attitudes Toward Quality

As part of this assessment an extensive survey was conducted of grain buyers' attitudes toward quality, grain standards, and merchandising practices. Several general findings are important. First, all buyers, but particularly those outside the United States, indicated that uniformity between shipments was a problem (i.e., uniformity in intrinsic quality). As processing technologies become more sophisticated, uniformity will become more important. Second, in the case of wheat, nearly half the foreign buyers relied on imports because of the inadequate quality of domestically produced wheat; wheat from all other exporters was preferred at equal prices to similar types of U.S. wheat. Third, buyers thought that the standards for wheat, corn, and soybeans were inadequate and did not accurately describe the underlying shipment. Fourth, no one set of quality attributes meets the demands for each product of the grain system.

U.S. Farm Policy

Two important features of U.S. farm policies have an impact on several aspects of quality. Because of the inverse relation between yield and intrinsic quality, the target price program in wheat (and to a lesser, or less identifiable, extent in feed grains) has a negative long-term impact on intrinsic quality in conjunction with price differentials less than those of the market. As the target price typically exceeds the market price, farmers have an incentive to expand yields. Impacts vary by grain and region, depending on the extent of the inverse relation between yield and intrinsic quality. The effect had been exacerbated by previous farm bills

that used different methods of determining yield. The total impact in the case of wheat has been to force market premiums for wheat protein to relatively high levels in order to neutralize producers' decisions.

Administration of the loan rate program also has an impact on intrinsic quality, as well as on physical and sanitary quality. In particular, the market for measurable quality characteristics is distorted because premiums and discounts on forfeited grains, particularly wheat, are less than those determined in the market. Poorer quality grain is put under storage, and market differentials are depressed.

Changing Role of Demand

The international wheat market is more differentiated today than at any time in the past 25 years, a reflection of the divergent nature of end use and the intensity of exporter competition. Unique preferences were identified in the OTA survey across types of wheat, suggesting homogenization would be counterproductive. In general, demand has shifted toward higher protein and soft wheats. An important related problem in international wheat competition is that the market premium for protein has increased substantially in recent years. This has caused a number of difficulties in the marketing system (due to measurement and uniformity problems), and has affected international competition. Specialization and sophistication in corn and soybean processing have also opened new markets with more exacting quality requirements.

Competitors' Policies

Major differences exist in the institutions, policies, and trading practices in other grain exporters marketing systems. The extent of market intervention varies from highly regulated throughout (e.g., Australia and Canada) to partial or no regulation. Differences also exist in procedures for variety development and release, the use of variety identification in the marketing system, and the use of grain receival standards. In addition, a number of countries address grain quality problems as part of their effective agricultural policy variables. At least for wheat exporters, the quality at first point of sale is more extensively controlled than in the United States. The wheat from these countries is now probably preferred over U.S. wheats at the same price due to these mechanisms.

POLICY OPTIONS

A number of policy alternatives are available to address these problems. Their overall purpose is to create a policy environment that enhances grain quality. As discussed, the U.S. grain production and marketing system is highly interdependent, and policies focused on any one sector affect other sectors to differing extents. This section analyzes a number of specific policy alternatives in the context of the interdependence of the system. Alternatives can range from regulation to reliance on the market.

Market Solutions and Regulations

A properly functioning market system can solve many of the apparent problems in quality. To do so, however, appropriate information must be provided so that relevant incentives and disincentives can develop. A fundamental policy alternative is to create an environment that would improve the ability of the market to identify and allocate grains of differing qualities to the highest value use.

The market for different quality characteristics drives the multitude of individual decisions that affect quality from seed to end use. Through the market for quality characteristics, price differentials develop that provide incentives and disincentives for participants throughout the system. An important aspect of this market is that premiums and discounts, and therefore incentives and disincentives, develop

for important measured characteristics. Bargaining and contracting for quality specifications occurs throughout the system, explicitly or implicitly, between buyers and sellers. Premiums and discounts are built into contracts, reflecting marginal valuations of the participants, and limits are frequently included beyond which the shipment would be unacceptable. Thus, fairly fluid implicit markets (i.e., premiums and discounts) exist for characteristics such as protein quantity in wheat; damaged kernels, dockage, moisture and broken corn/foreign material in corn; and damaged kernels in soybeans. These reflect market-determined values of these characteristics. Less is known about other unmeasured quality characteristics (intrinsic or otherwise), and the market is not necessarily capable of reflecting end values in underlying prices.

The important point is how the market works, through premiums and discounts, and that it works efficiently only for easily "measurable" (and verifiable) characteristics. This poses the fundamental problem in that not all items of importance in end use are easily measurable in the marketing system. In fact, as discussed, few intrinsic characteristics are included in the standards. Instead, proxies are often used that are less than precise. Domestic buyers can make purchases by location, or by region, an alternative not easily exercised by foreign buyers. The problem is lessened somewhat to the extent that variety release procedures use quality tests that are important but that are not used in the marketing system.

An alternative to market solutions would be to impose regulations, which could very well solve many of the perceived quality problems. But regulations impose costs on the system, which due to the competitiveness of the marketing system are passed back to producers in the form of lower prices and/or to users in the form of higher prices. Higher costs associated with regulation would not be absorbed by the handling system. In other words, regulations impose costs on the system that buyers maybe unwilling or unable to pay for in the form of higher prices. Wheat cleaning provides a classic example: To impose regulations across all participants in a marketing system such as that in the United States would violate the important principle that market participants can specify the cleanliness they want. Regulations therefore control the process and limit the range of qualities available, in contrast to a market where "anything goes" if buyer and seller agree.

Although all buyers may prefer a particular characteristic, all may not value it sufficiently to absorb the higher cost. Consider wheat dockage, for example. On the supply side, cleaner wheat can be produced and exported, as in other countries, by imposing regulations. End-users all prefer cleaner wheat but their reservation values—or willingness to pay—differ. Wheat millers in the United Kingdom, for instance, may have a high reservation value for clean wheat because they have to pay a Variable Import Levy on dockage equal to that of wheat. Or buyers with high per-ton transport costs or the need for extended storage (the costs of which increase with dockage levels) would have high reservation values for clean wheat. On the other hand, wheat importers with low transport costs and/or high resale prices for internal feed grains (an alternative use for wheat cleanings) would have low reservation values for clean wheat. In a competitive market, the distribution and allocation of the measured characteristic can easily be illustrated. Each buyer would have alternative contract specifications reflecting individual marginal reservation values. Buyers would specify contract limits by appropriately evaluating their values with the price differentials in the market.

Imposing a regulation on a quality level for all shipments has two general implications, First, the limit would have to be imposed on all shipments to preclude buyers with low reservation values from downgrading their specifications. Second, the result would be a higher overall price level, unless the cost were absorbed by lower producer prices, and some buyers with low reservation values would be excluded from the market.

One of the overall purposes of quality certification is to facilitate trade and to assure buyers of quality. Indeed, U.S. grain standards

provide measures of physical quality and to some extent information to facilitate trade on those dimensions of quality. But, as noted, the quality of some grains regarding some intrinsic and sanitary characteristics is not necessarily resolved in the grain standards. Buyers' true preferences are for intrinsic characteristics such as loaf volume (bake test), farinograph measures in wheat, and oil and meal content in soybeans. None of these is measured in the marketing system for technical and institutional reasons. True performance cannot be assessed until after the purchase, and in many cases until use. As a result, buyers make purchases based on expectations of intrinsic quality that reflect reputation. Thus, it would be desirable to have a low variance with respect to these immeasurable intrinsic characteristics—resulting in more reliable expectations.

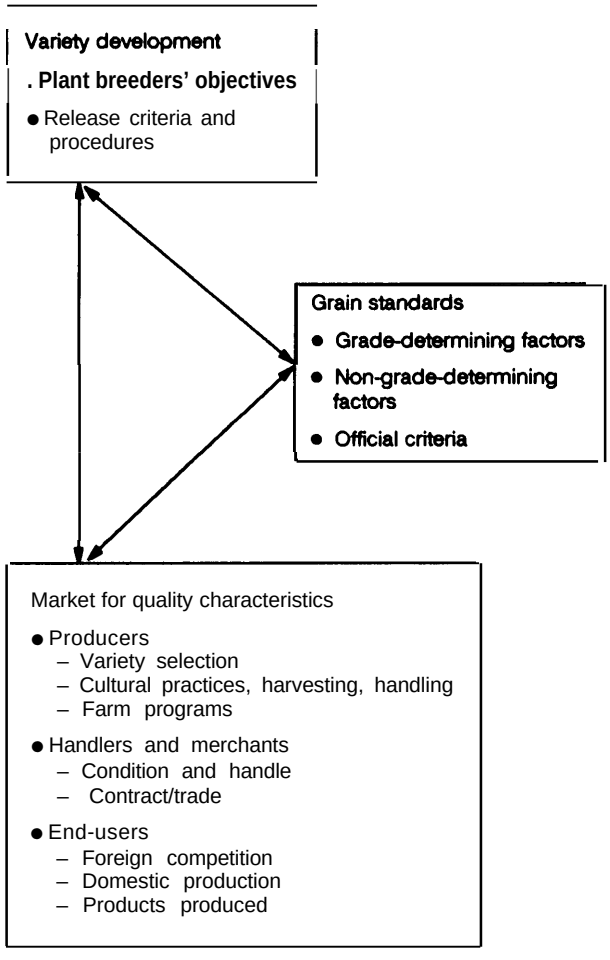
Information with respect to these quality characteristics is one-sided: Typically the seller has more information about quality than the buyer does at the point of negotiation. As an example, producers know the variety at the time of sale, but it is not revealed. Handlers know the extent or components of the blend, or the extent of conditioning, and this information is not revealed either.

This level of informational uncertainty provides an economic justification in general for sellers to provide certificates of quality. The role of certification is to reduce uncertainty for buyers, and therefore to facilitate trade. Traditionally certification via the grain standards is largely on physical, and somewhat on sanitary, characteristics. However, this is not the case with respect to important intrinsic characteristics. Thus one of the purposes of certification is elimination of uncertainty about quality, not only physical, but also sanitary and intrinsic. Accurate and relevant information therefore allows buyers to make purchases without conducting extensive testing, which would reduce liquidity of the market. As a result trade is facilitated, and transaction costs are reduced. One of the mechanisms to reduce this informational uncertainty is the grain standards. Others include controls earlier in the grain production system, such as variety release criteria. The impetus of these controls in a number of other countries is to reduce quality uncertainty in dimensions not easily measured by standards.

Interdependence of the Grain System

The interdependence in the production and marketing system with respect to quality is illustrated in figure 11-1. This triad could be viewed as a three-legged stool, with each leg having an impact on quality as well as on the overall system. Producers make varietal and agronomic decisions in response to incentives. These, as noted, are also influenced by farm

Figure 11-1.-Components of the Interdependent Grain System



SOURCE: Office of Technology Assessment, 19S9

programs. The demand for characteristics is influenced by end-use needs and foreign competition. Merchants and handlers procure, handle, condition, and blend to meet contract specifications. In addition, they make offers on what they can sell, and at what price differentials, based on the availability of quality characteristics and their conditioning capabilities. Each of these activities are influenced by the incentives established in the market, by trading rules, and by grain standards. Blending to the factor limits specified in the standards is one example of this interaction.

Fundamental Policy Alternatives

The interdependence of variety development, the market for quality characteristics, and grain standards must be recognized in the evaluation of policy alternatives with the objective of a more integrated relationship between policies. A number of other exporting countries have more integrated and better coordinated policies than those of the United States. In fact, the United States has made no effort to coordinate and/or integrate policies affecting these activities. Policy interventions could be focused on any of the components of the system, but assessment of their effectiveness must include impacts elsewhere in the system. Any policy on grain standards, for example, will affect variety development and the efficiency of the market for quality characteristics. Similarly, any policy affecting the market (e.g., incentives) will have an impact on variety development and grain standards. The inability to measure intrinsic characteristics in grain standards has implications for policies affecting the market and variety development.

Policy cannot affect numerous phenomena that influence quality, such as weather, and a number of policies are short-run and only treat symptoms of the problem. The policies developed here aim to affect underlying causes of the problem, which over the long term will result in improved quality. They are limited to the three general categories of variety controls, market intervention, and grain standards (see table 11-1). The policy alternatives have been narrowed to these three to focus on those that appear to be most logical and likely to be effective in the long run. Only selected alternatives are presented in each category; in reality, a continuum of alternatives is likely, rather than having discrete choices as shown in the table.

Just as there is an interdependence in the system, the policy alternatives must interact. Controls over variety identification and release improve the efficiency of the market, and have the potential to act as a surrogate for intrinsic measures in grain standards. If variety release were controlled, there would be less of a need to measure intrinsic performance in the grain standards. Instituting incentives can also act as a surrogate for control of both intrinsic and/or physical and sanitary quality characteristics. In addition, depending on application, instituting incentives can indirectly spur variety development. By the same token, policies applied to grain standards affect both the market and variety development. Should intrinsic quality characteristics be measured in the grain standards, the market would establish incentives, which would be transmitted to producers and to variety development. If such characteristics are not measured, alternative mechanisms should be used. As mentioned, in

Table 11-1 .—Fundamental Policy Alternatives

Variety controls	Market intervention	Grain standards
No change	Marketing board	Mandatory USGSA inspection
Variety identification) categorization	Export bonus	Single agency to approve testing
Variety licensing	No change in loan policy	Mandatory USGSA inspection in conjunction with NIST equipment approval
	Increased differentials in government policies	
	Minimum quality specifications for farmer loans	

SOURCE: Office of Technology Assessment, 1989

most other exporting countries, the policies across these three sectors are coordinated and viewed systematically.

Variety Controls

Three important considerations lead to the policy alternatives listed under variety controls. First, with few exceptions grain standards do not measure important intrinsic characteristics. Second, intrinsic quality differs significantly across some varieties. Third, varieties are not visually distinguishable, thus segregation in the market system is precluded, resulting in increased uncertainty about quality. These three points apply to some extent to each of the grains, though their relevance—and thus the attractiveness of each alternative—varies. The classic case is that of wheat, in which performance varies across varieties and increasingly it is becoming difficult to differentiate wheats in the marketing system. In some of these cases it may be easier to identify variety, or groups of varieties, than intrinsic characteristics. Further, identity of a variety provides more comprehensive quality information than any subset of measured quality characteristics. To some extent, domestic processors attempt to resolve problems of varietal differences by purchasing by location or region. But foreign buyers, or any buyers using purely grade specifications, are precluded from this option.

No Change.—Five main effects of leaving the variety control system unchanged can be identified:

- ***Continued lack of uniformity in intrinsic quality characteristics among States/regions/shipments.*** In the current system with only informal, uncoordinated variety release criteria, many basic characteristics vary among varieties, These characteristics lose their identity in a market incapable of measuring end-use characteristics. As a result there are important intrinsic quality differences across regions of the country that are not detected in the marketing system.
- ***Problems elsewhere in the system due to the inability to measure intrinsic quality.*** In particular, greater pressure would be placed on grain standards to measure intrinsic quality within the marketing system.
- ***Continued lack of information on intrinsic quality in some grains, and thus of current inefficiencies in the market.***
- ***Productivity growth facilitated to a greater extent by having complete freedom on variety release and selection.***
- ***Buyers seeking consistent intrinsic properties purchasing from exporters with less diversity.***

With no change from the current system of administering variety release, the pressure on grain standards to introduce measures of intrinsic quality would increase. Other countries use variety identification and release procedures in part to reduce pressure on the grain standards to measure intrinsic quality. Alternatively, by incorporating intrinsic quality into farm program policies (discussed later in this chapter), at least some incentive to improve intrinsic quality could be built into the system.

Variety Identification and Categorization.— Any sort of variety identification or control scheme would pose administrative challenges. One alternative would be to provide a mechanism (which does not currently exist) in which varieties can be identified in the market system, as done in other exporting countries. These consist of affidavit systems, random testing using electrophoresis, and categorization. Producers would declare the variety at the point of first sale or loan application. This would provide information to handlers on segregation based on categories of the grain, or groups of varieties. Categories would be developed according to end-use similarity, and could become part of the grain standards.

Alternatively, variety or groups of varieties could become part of the contract governing the transaction, as in France. The number of categories established would vary by grain, depending on the three considerations discussed earlier, and the end-use specificity. Thus, for example, if there were only one end use and the varieties did not vary sufficiently with respect to intrinsic quality, only one category

would be necessary. On the other hand, for wheat with intrinsic differences across varieties and a multitude of end uses, there would be a larger number of categories. The intent here would be to formalize a mechanism not dissimilar from the current system of classification for wheat. The difference, however, is that the current system relies on visual distinguishability, and categorization is based on fairly imprecise criteria.

The implications of such a categorization system include:

- ***An increase in information (by category of varieties), thus increasing the efficiency of the market in its allocative role.*** For most grains, variety is a better indicator of quality than are selected tests for quality. Thus buyers' information regarding quality would be improved.
- ***Improved signals transmitted to producers, breeders, and end-users through a more efficient market.***
- ***A complex administrative program, especially given the large number of varieties currently grown in the United States.*** Administration would be further complicated by the fact that intrinsic quality depends not only on variety, but also on location and climatic factors.
- ***More complex contract specifications.*** The informational requirements, particularly of foreign buyers, for contract specification would increase. Depending on the extent of categorization, however, this complexity could be reduced.

Introduction of a variety identification scheme would result in incentives and disincentives being readily associated with varieties having desired/undesired intrinsic characteristics. In addition, it would reduce pressure on the grain standards to measure intrinsic performance in the marketing system, as categorization of varieties would serve that function.

Variety Licensing.—A more restrictive approach would be to institute a variety licensing scheme. Varieties would be subjected to criteria administered at a national level for release into the market system. Licensing takes various forms in different exporting countries, from quite restrictive, as in Canada and Australia, to fairly neutral, such as the system in France. The intent of each though is to provide some mechanism that assures certain intrinsic characteristics (given that they cannot be easily detected in the market system) and to apply uniform criteria throughout the country, i.e., to reduce uncertainty of intrinsic characteristics through uniform application of release criteria. The program would require procedures similar to those of the variety identification system just described above. In addition, some criteria would have to be established for categorization (i.e., to license varieties by end use), and for administration.

Five effects of such a system can be identified:

1. increased uniformity, and an increase in the ability to control intrinsic quality;
2. a formal mechanism for categorization relative to a simple variety identification scheme;
3. depending on administration, a feeling of restrictions on productivity growth, although this is not necessarily the case, e.g., in France;
4. difficulty in administration, with complex enforcement, bureaucracy, and cumbersome implementation; and
5. licenses by location, due to differences in quality, and by end use.

A stricter variety licensing system would have similar impacts on interdependence discussed under the preceding alternative policy. In particular, licenses could act as surrogate grain standards for intrinsic characteristics.

Market Intervention

Marketing Board.—Central to the U.S. system is the market in which prices are established. Embedded in this market, and all prices, are premiums and discounts for measurable characteristics that serve to allocate grain across different users. In addition, these quality characteristics provide the incentives and disincentives for participants throughout the marketing system. Several other countries accomplish this by some form of board control.

Thus, one alternative in the United States would be to establish a marketing board system to resolve quality problems. The emphasis of the discussion here is on the implications of such a system for quality and the coordination of policies on quality. Other effects of a marketing board are more far-reaching (e.g., bargaining power, resource allocation, impacts on nonboard grains, and impacts on physical coordination) and are not discussed. The major implications of a board with respect to quality are:

- ***Coordination of the many aspects of the production and marketing system that have an impact on quality.***
- ***Improved quality to the extent that only two transactions—one between producer and board, and another between board and buyer–would take place in the marketing system.*** This is in contrast to the multitude of current transactions, all requiring measurement of quality.
- ***More subjective and judgmental administration of price differentials, since transactions would take place without an active market.*** Market determination of price differentials is an important advantage of the current U.S. system.
- ***High cost, given the complexity and breadth of the U.S. marketing system.*** Countries that already have boards operate in relatively simple logistical systems, and cover few grains. As either of these increase, as they do in the United States, the problems associated with bureaucratic allocation of decisions intensifies.
- ***Loss of the highly efficient U.S. grain handling and distribution system that stems, in part, from the competitive environment.***

A board system could reduce the emphasis on grain standards at the point of export, and for that matter throughout the system, if sufficient controls were imposed early in the system to resolve grain quality problems, thereby reducing the importance of quality measurement at the point of export. In addition, variety release procedures could be easily administered in a board system. Incentives could be administered rather than relying on market determination.

Overall, however, the costs of introducing a board system in the United States would likely outweigh the benefits of quality improvements.

Export Bonus.—An alternative policy would be to establish a bonus payable to exporters who deliver quality superior to contract specifications. This policy is discussed as being applied at the point of export, but it could be applied elsewhere in the marketing system. The major implications of this approach are:

- ***Immediate results, especially if the program were tied to a physical or sanitary quality characteristic.*** However, longevity should be a concern, in that if terminated, the effects would not likely last.
- ***Administrative questions.*** First, which quality characteristic(s) should be tied to the bonus—physical, sanitary, or intrinsic? Quality would improve on whatever characteristic the bonus were applied to. Depending on the length of the program, however, the bonus would likely not influence intrinsic quality. Second, should the bonus be applied at the point of export, or the point of origin?
- ***The cost of administration, and/or a direct outlay, to finance the program.***
- ***A risk that importers may manipulate the system by specifying a lower grade, in order to receive the same grade they traditionally purchase, but at a lower price.***
- ***An increase in perception of quality, or of attention to the issue.***

An export bonus program, by definition, would be oriented to the merchants and handlers in the system. It would provide incentives for them to improve the quality of particular attributes or particular shipments to which the bonus were applied. Due to competition within the industry, any benefits would be distributed to appropriate decisionmakers so as to provide incentives. Given that more information would not be provided to the market, and that information uncertainty would not be reduced, the efficiency of the market would not be improved. Breeders' objectives and release criteria would be affected only to the extent that the bonuses were applied to intrinsic characteristics, and

to the extent they were applied over very extended time periods.

No Change in Loan Policy.—The current administration of the policy on loan forfeitures and Commodity Credit Corporation (CCC) grain storage policies could remain the same (see ch. 9). The fundamental problem is that price differentials for loan forfeitures and transactions on CCC-owned grain are substantially less than those in the market. Implications of no change from the current status are:

- ***A distorted market for quality characteristics.*** The loan and CCC storage practices would continue to support the price of lower quality grains. In addition, the intrinsic, physical, and sanitary quality of U.S. grain would be unchanged.
- ***Grain under extended storage, which would potentially deteriorate more than if grain of superior physical and sanitary quality were stored.***
- ***Growers isolated from the market, which masks the incentives for improving quality.***

In general, the market today is distorted in the allocation between storage and commercial sales, with superior-quality grain going to the latter. Since the program does not effectively distinguish intrinsic quality, loan rate disincentives do not transmit signals to producers. Thus, a major impact of not changing the policy would be to increase the role and function of grain standards in measuring quality.

Increased Differentials in Government Policies.—In a number of other countries quality problems are addressed as a matter of agricultural policy. These take the form of incentives by using regulations and substantial premiums and discounts for quality deviations. Realigning the incentive system via farm policy addresses one component of the system, i.e., the market for quality characteristics. That market already exists and develops premiums and discounts. But it is distorted somewhat by administration of the farm program. Thus, this policy alternative could be seen as merely eliminating a distortion, which would allow the market to function more efficiently. Alternatively, farm policy could take the lead by providing price differentials at least equal to market differentials, to provide incentives throughout the system.

As discussed in chapter 9, CCC administers programs for handling and storing CCC-owned grain. Different rules are applied to country and terminal elevators. CCC requires that terminal elevators deliver the quality that is represented by the warehouse receipts, and it discounts individual railcars. CCC does not pay terminal elevators for overdeliveries in quality. This is not the case for country elevators, which are not subject to the same rejection rules if the quality delivered is inferior to the warehouse receipts and which receive payment for overdeliveries.

One of the few ways to legislate incentives into the system, particularly for intrinsic quality, is via the price differentials for loan forfeitures and transactions involving CCC-owned grain. This alternative consists of loan-associated price differentials greater than or, alternatively, equal to the market. They could be applied as currently done, on grades, or could use specific physical and sanitary quality criteria. A simple example would be a 4 cents/bushel price differential for clean wheat (i.e., less than 0.5 percent dockage). In addition, measures of intrinsic quality (e.g., falling number in wheat, oil content in soybeans, protein content in corn) could be incorporated, as they are in other countries.

The implications would be as follows:

- ***A greater impact on wheat than other grains, because the relationship between market prices and loan values varies across grains and because participation rates vary.*** In addition, the impact itself would vary, due to the loan being effective only periodically.
- ***Grain of lower value being forced onto the market, as opposed to going into the loan program, as it currently does.*** This implies also that the loan program would support prices of higher quality grains.
- ***An increase in the amount of grain going***

into alternative uses, with lower end value. The most vivid example is wheat feeding.

- ***Incentives for intrinsic quality relatively easily incorporated into the loan program (more easily, that is, than measuring them in the marketing system).***
- ***The development of a mechanism for measuring quality of grain going under loan, perhaps through samples submitted by farmers.***
- ***Difficult administration of optimum price differentials.*** This is especially true given the large number of markets in the United States, and given that—at least in the past—loans have to be announced long before crop quality is realized.
- ***Country elevators forced to become more concerned with maintaining quality.*** Also, CCC would be guaranteed that the quality of grain received into the country elevator would be delivered out of the elevator. This change in policy would relieve the pressure of maintaining discount schedules that reflect the market in that CCC would not accept quality below that called for by warehouse receipts.

This particular alternative addresses the market for quality characteristics and provides incentives in an important market for some grains. Such a change could have a number of systemwide benefits. First, to the extent that intrinsic characteristics are used, variety development would be favorably affected. Signals from this important market would be directly transmitted to breeders and would affect their objectives and release criteria. Thus it would provide somewhat of a surrogate for variety control. Second, there would be somewhat reduced pressure to measure intrinsic quality in grain standards. In the extreme of a proactive farm policy, together with variety identification/licensing, the role and function of grain standards could to some extent become one of measuring only physical and sanitary quality characteristics.

Minimum Quality Specifications for Loans. — Many countries have minimal receival standards on grain entering the marketing system. Normally grain marketing is integrally related to prices and policies (e.g., initial payments) and therefore it is difficult to isolate physical marketing from pricing. As developed here, minimum quality specifications would be applied to grain entering the loan program as opposed to when it entered the marketing system. The global application of minimum quality specifications to the U.S. marketing system would be next to impossible to implement since a majority of grain under loan is stored on farms.

The concept of setting minimum quality specifications for loans is similar to the option just discussed except that a constraint, rather than a price incentive, is being used for entry into the loan program. Minimum quality specifications could be applied to physical characteristics (e.g., minimal dockage) or intrinsic characteristics (e.g., variety, protein, falling number, oil, or meal protein).

Under this policy alternative, the potential exists that grain not meeting specifications would be diverted to the export market or a lower valued market. One way to help minimize diversion to the export market would be to use whatever quality specification has been established for government programs as a basis for rejecting grain going into an export elevator. This would have the added benefit of reducing the spread of qualities available for blending within the export elevator; however, blending of wide ranges in quality would still occur in country/terminal facilities. As discussed in the next section of this chapter, mandatory inbound inspection into export elevators could serve as the basis for rejecting or accepting grain.

The first five implications of increased differentials in government policies would also apply to this alternative. Other implications are:

- ***Minimum quality specifications, which would be difficult to establish and maintain in the current political environment.***
- ***Desirable quality characteristics incorporated in the loan program.*** These could also be characteristics not easily measured in the marketing system.

- ***Depending on the minimum quality specifications (physical, sanitary, intrinsic, or variety), a requirement for farmers to certify the variety planted or take samples of stored grain for testing as directed by the U.S. Department of Agriculture (USDA).***

Use of minimum quality specifications could also solve or contribute to the resolution of problems elsewhere in the system. Desirable varieties or intrinsic characteristics, if used, would transmit signals to breeders, influencing their objectives and release criteria. In addition, to some extent, the role and function of grain standards in measuring intrinsic quality in the marketing system could be reduced.

Grain Standards

The United States Grain Standards Act (USGSA), states that it is Congress' intent to promote the marketing of high-quality grain to both domestic and foreign buyers and that the primary objective for grain standards is to certify grain quality as accurately as practicable. Embedded in this policy are four basic objectives for grain standards:

1. to define uniform and accepted descriptive terms to facilitate trade,
2. to provide information to aid in determining grain storability,
3. to offer users of such standards the best possible information from which to determine end-product yield and quality, and
4. to provide the framework necessary for markets to establish grain quality improvement incentives.

Chapter 8 assessed the ability of the grain standards to meet these objectives. In several areas the current standards fall short. However, an ideal grain standard that encompasses all four objectives may be difficult to achieve, and trade-offs between objectives may be necessary. The criteria for standards laid out in chapter 8 in terms of the number of grades and what should constitute grade-determining, nongrade-determining, and official criteria provide a framework for incorporating the four objectives into grain standards.

The grain standards, if modified along these lines, would facilitate trade by providing a limited number of grades and grade-determining factors. Incorporating some factors as nongrade-determining or even official criteria allows the market to set values for these factors that will send signals throughout the system for quality improvement, if warranted. To a limited degree, this structure will provide information important to end-users, who will establish the limits that best suit their needs. Until new technology is developed for measuring intrinsic quality and several sanitary quality attributes, however, the standards cannot begin to reflect many of the objectives.

To comply with the objective of certifying grain quality as accurately as practicable, the USGSA provided several legislated mandates. First, it authorizes the Federal Grain Inspection Service (FGIS) Administrator to establish, amend, or revoke standards whenever their usage by the trade may warrant or permit. Second, whenever standards are in effect, the standard must be used to describe the grain being sold in interstate or foreign commerce. Third, the FGIS Administrator is authorized to provide for a national inspection system. Finally, whenever standards are in effect, the grain must be inspected by FGIS as it is being exported from the United States. As pointed out in chapter 8, even though the standards must be used to describe grain being sold overseas, no requirement exists for inspecting grain moving in domestic markets. Therefore grain can move domestically without inspection and, when inspected, can be checked by FGIS or a FGIS-licensed inspector, private inspection companies, individuals employed by a grain-handling facility, or individuals licensed by the Warehouse Division of USDA's Agricultural Stabilization and Conservation Service.

Several important ramifications for grain quality result from this policy. Since no single agency is responsible for testing grain according to the standards or any other set of specifications, no agency is responsible for developing the equipment and procedures used to sample and measure these factors or for over-

seeing the equipment, methods, and accuracy of results. For the market to properly assess premiums and discounts for quality characteristics, testing results for these attributes must be measured as accurately and consistently as measurement technology will allow. End-users rely on accurate measurement of important quality characteristics in purchasing and production decisions, and inaccurate results can lead to quality complaints and product yield and quality below expectations. (Ch. 8 describes the integral components for developing, maintaining, and standardizing testing procedures, and discusses testing accuracy and sources for testing errors.)

Since the grain standards serve as the basis for marketing grain and providing information on important quality characteristics to all users, the factors selected for measurement by the standards are important. Even more important is the way they are measured and the consistency of measurement. As new tests are added to the standards, there is no requirement that the testing technology developed and approved by FGIS as the basis for the standard must be used to measure the attribute.

In other instances, no requirement exists for how samples will be obtained, who will perform the tests, or even whether any test contained in the standard will be performed. Chapter 8 identifies problems associated with obtaining samples and the impact on accuracy of the type of equipment and amounts obtained. With regard to obtaining inspection, the recent inclusion in the wheat standard of the Food and Drug Administration (FDA) defect action limit of 32 insect-damaged kernels per 100 grams of wheat restricts the amount of insect-damaged kernels in the various grades to a level that coincides with the FDA limits. This change has caused a decrease in the number of requests for inspection under the USGSA because many shipments exceed the FDA defect action limit and FGIS must report any such cases to FDA. Therefore, the change has not provided FDA with the information it requires to act on such shipments, and wheat that exceeds the limits is still handled to some degree as it was before the change.

In addition, the USGSA allows FGIS to use delegated and designated agencies to perform inspections on its behalf. Designated agencies are independent businesses that rely on fees generated by performing inspections. Since designated agencies perform inspection services on request, the potential exists for these agencies to perform less than accurate inspections because of the need to keep their customers satisfied. This places USDA-approved agencies in the same position as independent, nongovernment businesses whose sole aim is to satisfy the paying customer.

Other potential conflicts arise from not specifying how the standards will be implemented. Since inspections on domestic grain shipments are performed on request, they can also be dismissed. The potential impact on grain quality is that a request can be dismissed and the grain shipped if it is discovered during the course of the inspection that the quality is not up to specification. For example, if sour grain is found and reported to the elevator manager during the sampling of a barge being loaded, the elevator manager can dismiss the inspection request. If the sales contract calls for an “official grade, ” the manager can call for the barge to be sampled at rest. In this instance, the portion of sour grain that was previously discovered during loading will be commingled in the barge and probably not found during sampling.

Several policy alternatives exist for developing a program to reduce the potential for testing inaccuracies and provide consistently accurate results—mandatory USGSA inspection on domestic grain moving in interstate commerce, the creation of a single agency to approve and oversee testing equipment and procedures, or a combination of these two approaches.

Mandatory USGSA Inspection.—As noted, FGIS establishes standards, which includes developing technology to measure the factors contained in the standard. The agency also develops and publishes sampling and inspection procedures, evaluates and approves equipment for use during inspection, monitors inspection accuracy of its employees and licensed inspec-

tors, and periodically tests sampling and inspection equipment for accuracy. Therefore, a basic structure is in place for approving and overseeing all equipment and procedures used for measuring grain quality characteristics.

At one time mandatory inspection was required on all grain moving in interstate commerce. This provision was deleted from the USGSA by Congress in the late 1960s because of the difficulties in enforcing it on truck shipments. It was at that time that the provision requiring the use of the standards for merchandising grain was included in the USGSA.

The implications of requiring mandatory inspection on interstate grain shipments, including adoption of the best possible sampling technology, are as follows:

- a reinforcement of the policy that standards must be used to describe grain being bought and sold and that the factors covered by standards are tested using approved equipment and procedures as the basis for the test;
- consistency in test results in that identical procedures are used for each inspection in the marketplace and are performed by independent government-sponsored agencies;
- primary responsibility for grain quality measurement focused on one government agency;
- use of the existing basic framework through the delegated and designated agencies who already own approved equipment and have trained employees that use FGIS-published procedures;
- applicability to railcar and barge shipments only, as the ability of delegated and designated agencies to cover the wide areas required to meet the needs of country elevators receiving trucks is severely limited; and
- increased costs associated with obtaining inspection on grain that would otherwise not need to be inspected (i.e., grain moving from one facility to another owned by the same company).

Single Agency to Approve Testing.—As discussed in chapter 8, the National Bureau of Standards (renamed the National Institute of Standards and Technology* (NIST)), through the National Conference of Weights and Measures, standardizes weights and measures by developing specifications for instrument *precision* and accuracy along with scale tolerances, and maintains national standards. Currently, NIST addresses neither grain measures other than weights nor sampling equipment. In some instances, individual States have taken it upon themselves to develop criteria for approving inspection equipment and monitor the equipment accuracy. (Moisture meters and mechanical truck probes are prime examples.) In addition, the grain-industry-sponsored Grain Quality Workshops recommended that NIST take the lead in developing and overseeing moisture meter calibrations.

NIST, in consultation with FGIS, could take the lead in developing and maintaining equipment specifications and maintenance tolerances. These actions could be in conjunction with FGIS developing new tests to be included in the standards. NIST approval could be the basis for approving equipment (including sampling equipment) for use by FGIS when performing inspections and could be administered by the individual States for testing not performed under the USGSA. Many States currently have agencies responsible for grain-handling facilities (country as well as terminal elevators) within their jurisdiction. And several States have already established procedures for approving and testing moisture meters and sampling devices. The basic framework is in place for establishing a central body to approve and oversee the equipment used in conjunction with grain quality testing.

The need for standardized testing procedures for sampling devices, moisture meters, and near infrared reflectance (NIR) equipment is apparent. As more uses for NIR and other sophisticated tests are found to provide important qual-

*The National Bureau of Standards was recently renamed the National Institute of Standards and Technology (NIST) with the passage of the Omnibus Trade and Competitiveness Act of 1988 (Public Law 100-418) as of August 1988.

ity information to buyers and sellers, the need for standardized testing will become more critical, especially on farmer-owned grain at the country elevator level.

The implications of giving NIST responsibility for approving and overseeing inspection equipment are:

- ***Standardized equipment to measure grain quality attributes that could be traced back to national standards.*** Variations in testing results introduced by a wide range of equipment accuracies is reduced.
- Use ***of only approved equipment to provide testing results, with NIST oversight to ensure accurate testing.***
- ***Use of the existing basic framework.*** NIST already has established approval procedures, publishes user requirements, and enforces its provisions through State organizations.
- ***Placing responsibility for approving grain testing equipment in an agency that does not have a vested interest in the equipment's use.***
- ***An inability to cover tests that are subjective in nature, such as odor, wheat classing, and determination of damaged kernels.***
- ***A lack of experience in basing a national standardization program on reference methods that are defined rather than proven.***
- ***Increased costs for those that have to dispose of unapproved testing equipment and purchase approved equipment.***
- ***Avoidance of the issues of who will use the equipment and when it will be used.***

Mandatory USGSA Inspection in Conjunction With NIST Equipment Approval.--A policy that requires mandatory USGSA inspection on grain moving in interstate commerce and a broadening of NIST involvement into grain sampling and testing equipment captures the advantages of the last two options while minimizing many of the disadvantages.

The advantages of mandatory inspection on railcars and barges moving in interstate commerce ensures that consistent sampling and testing is performed on both subjective as well as objective factors and that one agency is responsible for grain testing as well as standards development. The inability to perform USGSA testing on trucks and at country elevators can be compensated for to some extent by involving NIST and its related support systems in the grain-testing area. Even though USGSA inspection would not be performed, those groups that do perform testing would be required to use approved equipment and to follow the user requirements spelled out in the NIST approval. This would be the same requirements that USGSA inspectors follow, since FGIS would also be using NIST-approved equipment and user guidelines.

This policy alternative allows country elevators to continue to perform their own tests on grain received from the farmer, thus reducing the potential increase in costs associated with mandatory USGSA inspection. But it would create more uniform testing since anyone performing grain quality testing will be required to use NIST-approved equipment and follow published user requirements. Coupled with the NIST State support systems already in place to oversee equipment accuracy and ensure that user requirements are followed, NIST involvement would provide oversight in areas not previously subjected to it.

Interactions Between Standards, Variety Control, and Market Intervention

The policy alternatives outlined in the variety control section address intrinsic quality characteristics, since physical and sanitary quality cannot be addressed through such programs. The policy choices discussed in the market intervention section can address the easily measurable factors for physical and sanitary quality, and can be expanded to deal with intrinsic quality attributes once technology is developed to measure them in the marketplace. Each section cited examples of the expected impacts on grain quality and standards.

In both the variety control and market intervention sections, an option for no change in present policies has been provided. Such an approach places the responsibility for physical,

sanitary, and intrinsic quality solely on grain standards. For the physical and many of the sanitary quality concerns, relying on the grain standards is a relatively simple matter that does not involve the adoption of new technology. It involves taking existing factors and applying the criteria developed in chapter 8. Several factors could be combined (as is the case of foreign material and dockage in wheat, as many have suggested, as either grade-determining or non-grade-determining) or factors could be separated (as is the case with broken kernels and foreign material in corn) to describe quality more accurately. In addition to rearranging existing factors into grade-determining, non-grade-determining, or official criteria, fixed percentages could be established for certain factors that transcend all grades (e.g., maximum level of dockage in wheat or maximum moisture levels in corn and soybeans). Limits for current factors (e.g., live insects or stones) could also be tightened.

Making no change to variety control systems or market intervention has a dramatic impact on the grain standards, however, in that they must be able to address the buyer's desire for information on important intrinsic characteristics and take the lead in establishing the signals regarding quality for the entire system. Presently, technology to easily measure intrinsic attributes in the marketplace is not available. If the standards are to be the vehicle for providing information on intrinsic and many new sanitary quality characteristics (e.g., pesticide residue), resources must be provided to develop the technologies needed to accurately and easily measure them before the market can respond. It will take years to research and develop new tests that could be put on-line before signals begin to be transmitted back through the system.

In addition to identifying what factors the standards should measure and whether factors are grade-determining, non-grade-determining, or official criteria, the way the standards are implemented can also have a dramatic impact on grain quality. One of the major problems facing the United States in terms of grain quality—whether physical, sanitary, or intrinsic—is that all grain, no matter the quality, is accepted into the system and marketed. This places enormous strain on the system's handling and inspection capabilities and is the cause for most of the blending controversies. Adding new tests to the standards or applying the criteria developed in chapter 8, including limiting the number of grades, will not resolve the problems associated with blending extremely high-quality with extremely low-quality grain.

As discussed in chapter 8, limiting the spread between grades will reduce the opportunity for blending. On the surface this appears to be a viable option. But the expected impacts from such a change assume that the grades being traded will remain the same. If the spread between grades is reduced and the trading grades are lowered, the opportunity for blending will remain the same. Even removing factors from being considered grade-determining does not in and of itself remove the incentive for blending. An example of this is provided by the recent change whereby moisture was removed as a grade-determining factor, forcing limits to be established in contracts. The change has not removed the incentive for blending wet and dry grain in order to meet contract specifications.

SUMMARY AND CONCLUSIONS

The U.S. production and marketing system is a highly interdependent system of activities. Any policy designed to enhance grain quality (physical, sanitary, or intrinsic) must address this interdependence. Traditional policy discussions, however, have focused on only one component—grain standards. But a properly functioning market can solve many of the grain quality problems. Therefore, a fundamental policy alternative would be one that creates an environment that would improve market efficiency. In addition, appropriate quality infor-

mation must be provided so that relevant incentives and disincentives can be established to improve market efficiency.

Just as there is system interdependence, there is interdependence of policy alternatives. Controlling variety release, for example, could improve market efficiency and act as a surrogate for intrinsic quality measurement. This reduces the impact of forcing grain standards to measure intrinsic quality characteristics in order to provide incentives. Market incentives can regulate physical, sanitary, and easily measurable intrinsic quality characteristics. The market can provide incentives in variety development while policies applied to grain standards affect both the market and variety development.

Given the interdependence of the system, policy could be focused on any one component. However, if grain quality is truly a result of the total system, then the success of policy changes to any one component must be assessed in terms of this interdependence. If existing policies for variety control and/or market intervention remain unchanged, the entire responsibility for improving quality will be placed on grain standards. For contrast, policy changes to variety control will improve the information for intrinsic quality characteristics needed by the market and reduce the need for grain standards to shoulder the entire burden.

Policy alternatives for enhancing grain quality have been divided into three general categories for the purpose of this assessment—variety controls, market intervention, and grain standards. One possible policy path that maximizes the strengths of the various options as well as minimizes their weaknesses is to adopt variety identification/categorization, increase the differentials in loan policy and specify minimum quality for farm loans, and introduce mandatory USGSA inspection in conjunction with NIST equipment approval.

Introducing a variety identification scheme would improve information on intrinsic quality characteristics, thus reducing the pressure on grain standards to measure intrinsic performance in the market. For most grains, variety is a better indicator of quality than are selected tests. The increased information resulting from variety identification would raise the efficiency of the market, resulting in incentives/disincentives being transmitted to producers, breeders, handlers, and end-users. Variety identification alone, however, does not address physical or sanitary quality concerns, so these concerns must be addressed by other areas.

Removing the distortion created by the current administration of premiums and discounts for loan forfeitures and applying the same rules to country and terminal elevators storing government grain would allow the market—which has already established premiums and discounts—to function properly. Grain of lower value would be forced onto the market as opposed to entering government programs. To the extent that intrinsic quality characteristics are included, variety development would be affected. Signals from government programs, directly transmitted to farmers, would affect their decisions on varieties planted, thus influencing breeders' objectives and release criteria.

Setting minimum quality specifications for loans places an additional constraint on entry into the loan program. These could easily be applied to physical and sanitary quality characteristics as well as measurable intrinsic characteristics and, along with the variety identification scheme, would reinforce signals being transmitted throughout the system. Farmers would be required to obtain testing of grain that was in the loan program and being stored on farm, rather than self-certifying quality as is presently the case.

Implementing such policies on government programs and minimum quality specifications will force lower quality grain into the export market. Therefore, minimum quality specifications established for entry into government programs could be applied to grain entering export elevators. This would transmit signals for improved quality throughout the system and would reduce the spread of qualities available for blending at export locations.

The need for accurate measurement of important characteristics—whether physical, sanitary, or intrinsic—is crucial to providing infor-

mation for the market to function properly. The vehicle by which quality information is transmitted throughout the system is grain standards. Incentives and disincentives cannot be established unless accurate, consistent, and timely information is provided in the market. This can be accomplished by continued efforts to incorporate the four objectives of grain standards, by implementing mandatory inspection, and by increasing NIST involvement in approving grain sampling and testing equipment.

Mandatory inspection of railcars and barges would ensure that consistent sampling and testing is performed. Used in conjunction with minimum quality specifications on grain entering export elevators, this would ensure that one government agency is responsible for quality testing. The increased presence of NIST in approving grain sampling and testing equipment would ensure that all parties testing grain quality use approved equipment and follow basic user requirements.

As discussed throughout this chapter, the interdependence between variety control, market intervention, and grain standards is complex. Grain quality is a function of the variety planted, farmer practices, environment and geographic location, handling practices, end-user preferences, marketing, government policies, and the ability of grain standards to provide information on important quality characteristics, Policy changes, therefore, must create an integrated policy for enhancing grain quality. Potential conflicts, overlapping benefits, and limitations of certain policy options must be recognized and addressed.