

Exporter Competition and Grain Quality

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There are a number of important characteristics of the competitive environment and markets for agricultural commodities and products grown in the Great Plains region of the United States. These include an intensely competitive environment with substantial market power, both for sellers and perhaps increasingly by the buyers. In addition there is great diversity in the quality of the crops produced within the region.

This diversity exists not only between crops (e.g., barley versus wheat) but also within a crop (e.g., the multitude of different types of wheat produced in the United States; feed barley versus malting barley; feed versus nonfeed oats, etc.). This diversity is greater than exists in other grain exporting countries and thus the marketing function is more complex in the United States than elsewhere. The challenge to the marketing system is to be able to simultaneously exploit the diversity of crop production capability and to achieve efficiencies in the grain handling and transportation system.

The world grain market experienced substantial growth during the 1970s, and most countries benefitted from this by being able to expand exports and production and marketing capacity. However, since the early 1980s world trade for most commodities has stagnated and the competitive rivalry between exporting countries has intensified. The U.S. market share for wheat, as an example, fell 45 to 50 percent in the early 1970s to early 1980s, and has since fallen to the areas of 30 percent to 35 percent (Figure 1). Most of the major exporting countries have recently evaluated their competitive position.

In a sense, each is trying to assure its marketing system is functioning as efficiently as possible in preparation for what may continue to be a volatile market with a slower growth rate than existed in the 1970s. While most attention is normally focused on issues related to trade policies (i.e., GATT, U.S./Canada Free Trade Agreement, European Community subsidies) lurking behind the scenes are developments which affect the efficiency of the production and marketing system in each country.

There has been greater attention to issues related to grain quality in recent years than during perhaps the past decade in the United States. At least part of the reason for this is the perception of the importance of quality being a competitive factor in trade. In fact it is perhaps an increasing realization of the importance of quality in exporter competition. There

have been a number of pieces of legislation to address these issues, and the 1985 Farm Bill mandated a comprehensive study of these problems. This study was undertaken by the Office of Technology Assessment (OTA) and the findings were recently released to Congress. Much of the material presented below is from this project. (For reference see: United States Congress Office of Technology Assessment; Wilson and Hill; Wilson and Orr.) The topics presented in particular relate to the institutions impacting quality in competitor countries and their comparisons to those in the United States.

To set the stage, OTA conducted a survey of overseas millers about their feelings toward U.S. wheat. Several major points gleaned from this survey are:

1. Assuming price and transport costs are the same, U.S. wheats were nearly always the least preferred relative to competitor wheats. The rankings in particular were:

Bread wheats:

Canadian Western Red Spring (CWRS);
Australia Price Hard (APH);
U.S. Dark Northern Spring (DNS); and
U.S. Hard Red Winter (HRW).

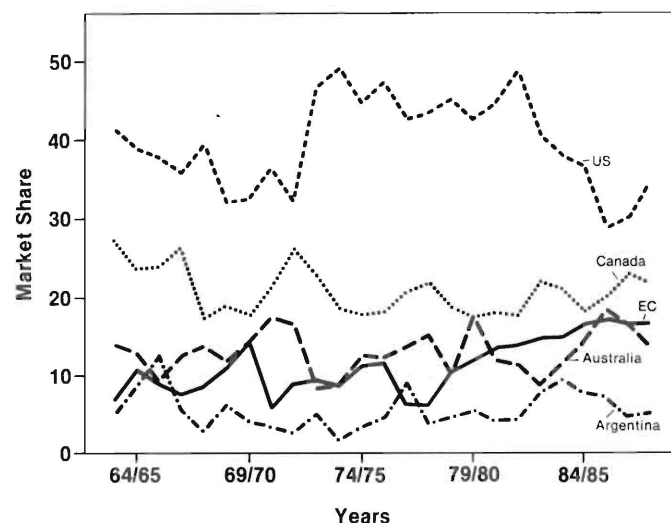


Figure 1. Market Shares of Wheat Exports by Major Exporters.

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Soft wheats:

Australia Standard White (ASW);
U.S. White;
U.S. Soft Red Winter (SRW); and
European Community (EC).

Durum:

Canadian Western Amber Durum (CWAD);
U.S. Hard Amber Durum (HAD).

2. Wheat class is not a good indicator of end-use quality.
3. Important criteria in approximate ranking include protein quality; pesticide residue; insects (hidden, dead); mycotoxin¹.
4. Overseas millers want some more information on dough handling properties (e.g., farinograph measures).
5. A major concern of survey respondents was an apparent increase in lack of uniformity in end-use quality (baking absorption, dough-handling properties).

In addition, a separate econometric analysis (Wilson and Gallagher and Wilson, July 1989) indicated that through time there has been a growing diversity of demands for end-use characteristics. In other words, demands have never been homogeneous, and the degree of difference in preferences appears to be growing through time.

In recognition of the importance of exporter competition, an important component of the OTA study was specific analyses of policies, institutions, and trading practices affecting grain quality in competitor countries. Each country has a multitude of institutions which influence quality. Important factors which influence the quality of grain are listed in Table 1. It was this general paradigm which guided the analysis of each of the individual countries.

These are largely self-explanatory and only a few comments are made for perspective. An important institution in each country is the mechanisms which exist for the release of varieties. The purpose of these mechanisms often is to provide a means to regulate quality characteristics not capable of being easily measured in the market system. It is important to note that a prerequisite for market regulation (premiums and discounts) is the ability to easily measure the characteristic. Another implicit effect of these mechanisms is that they provide a means to reduce the extent of lack of uniformity in end-use performance, a complaint of increasing concern of domestic and export millers.

The topic "trading practices" covers a wide range of issues but is crucial in making cross country comparisons. These include: the mechanisms by which premiums and discounts develop, whether by marketing boards or through a market system; local competitive environment; trading practices with respect to indigenous and extraneous quality characteristics; regulations regarding cleanliness and hygiene (e.g. infestation); and the extent that variety (declaration and marketing by variety) is used in the marketing system.

Each country has a grading system. The U.S. grading system typically only measures physical (not chemical) characteristics--but this mechanism is relied upon for the establishment of quality measures for which premiums and discounts develop.

Farm policies typically are avoided in any discussion of grain quality. However, these have an important impact on

Table 1. Factors influencing grain quality.

Variety Development and Release Mechanism
Agronomic Conditions
Trading Practices
Grading and Standards
Farm Policies

the quality of grain in a number of dimensions, including yield-inducing incentives, and therefore disincentives for quality improvement, and marketing incentives related to cleanliness/hygiene and storage. The important point of the paradigm presented in Table 1 is that the institutions and policies which impact the quality of grain exported are much more complex than simply looking at issues related to grades and standards. This, of course, has been the traditional area of debate in this country. More important is that it is a highly interdependent "system" which impacts the quality of grain offered for export.

For purposes here the grain quality paradigm is briefly described as it relates to wheat in the three major competitors of Australia, Canada, and France, and comparisons are made to the United States. The ordering of presentation is generally from the most regulated to the least regulated. Greater detail on these countries is available in Wilson and Orr, Wilson and Hill, and the OTA reports cited earlier. The latter also contains similar descriptions on corn and soybeans in Brazil and Argentina, and wheat in Argentina.

Australia

Virtually all of the varieties released in Australia are public varieties. The release mechanism consists of a three-tier committee at the national level. These committees ultimately approve varieties for production in specific locations in each state. Varieties are not licensed, but planting of individual varieties is impacted by Australian Wheat Board (AWB) pricing policies. The criteria for release includes traditional baking criteria, and more recently the board is trying to incorporate criteria for flat breads. All criteria are currently for bread wheats despite there being an apparent comparative advantage in the production of feed wheats. Agronomic characteristics include limited fertilizer applications and a wheat/sheep rotation which dominates the wheat economy. Growth rates in productivity are the lowest of the major competitors as shown in Figure 2 and Table 2. There has been a noticeable decline in protein over time, and the AWB has instituted pricing policies and other mechanisms with the intent of averting this trend. Recently the USSR, an importer of growing importance of Australian wheat, voiced concerns about this trend, and the AWB reacted because of the impact of limiting potential market penetration due to inadequate protein levels.²

Trading practices are dominated by the AWB and its policies. The AWB is the sole buyer of all wheat (the domestic market was recently liberalized to allow for private sales) and seller of typically 70 percent or more of the wheat. The AWB sets quality criteria for purchases and price differentials. In addition it administers a variety control scheme (VCS) whereby 1) criteria are established for release of varieties, 2) producers must declare the variety at the

¹See Wilson 1989a for an extensive discussion of these points.

²The USSR requires 12 percent protein, which could only be met by about 20 to 30 percent of the crop.

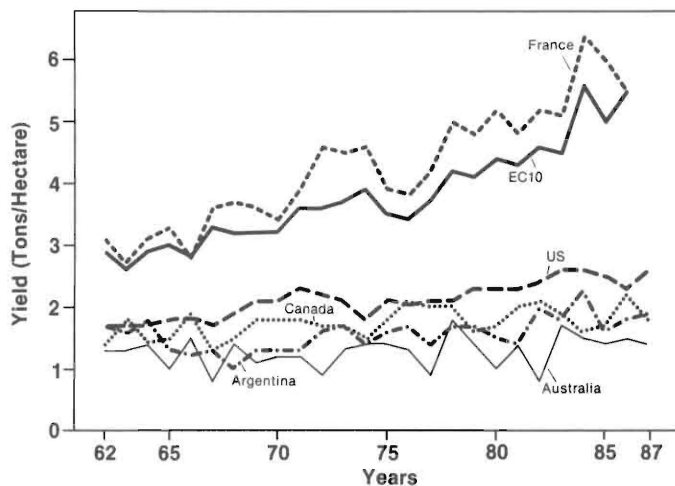


Figure 2. Yield by Major Exporters in Tons/Hectare.

point of first sale in the marketing system, and 3) price differentials are established by variety and by region (i.e., varieties in particular regions). In addition, implicit in the pricing policy (i.e., the guaranteed minimum price, GMP) are substantial price differentials depending on cleanliness and other factors. Quality of grain is controlled (regulated) from origin (in the extreme, from the breeding) through to the point of export. This is facilitated by state-owned grain handling enterprises (which do not take ownership) and the fact that the AWB is the only owner of grain. Thus, only one transaction takes place within the marketing system, thereby diminishing the role of grade standards to facilitate trade.

In Australia the grading system is called a "receival standard." The idea is that if grading criteria are rigorously applied at the point of origin, then problems would not develop at export. For some factors the same tolerance is applied for all grades except feed (e.g., unmillable material is 7 percent for all APH, Hard, and ASW grades, and discretely increases to 15 percent for GP). Associated with each of these is a price differential which induces striving for the top grades. Similar limit relationships exist with other factors (e.g., heat damage is 1 percent and discretely increases to 10 percent for GP).

Farm policy plays a limited role in the Australian wheat economy, but does have an important impact on quality. There is essentially no on-farm storage. The idea is that commercial handlers are better capable of maintaining quality. Another important aspect of the policy is the price differentials in the GMP which are established to provide incentives or disincentives for enhancing quality. For example, the spread between feed and ASW is \$32/mt. This and the other spreads have a tremendous impact on incentives regarding cleanliness, hygiene, etc. Therefore cleaning is normally done at the farm level, usually by fine tuning of the combine and/or using second screens. Spreads for certain varieties can be up to \$5/mt, which is a mechanism that can virtually eliminate planting of undesired varieties.

Canada

In Canada, varieties are regulated by the Canadian Grain Commission. Criteria are established which must be met for each class of wheat. Essentially a variety is released for

Table 2.* Growth rates in yields for major exporters, 1962-86.

	τ	β	R^2	Growth Rate %/Year
France	1.45 (88.46)	0.0133* (11.60)	.86	1.32
Canada	1.18* (56.24)	0.0043* (2.90)	.28	0.42
U.S.	1.22* (109.28)	0.0075* (9.54)	.81	0.75
Argentina	1.11* (37.05)	0.0055* (2.60)	.23	0.55
Australia	1.07* (25.97)	0.0019 (0.65)	.02	0.19
World	1.07* (131.56)	0.01146* (20.15)	.95	1.14

NOTE: These are regression results of our estimated equation: $\log(y) = \tau + \beta T$, where y = yield and T trend from 1962-86. Figures in () are t -ratios.

* Adapted from Wilson and Orr.

marketing in a particular class. In addition, because varieties play an important role in Canadian wheat marketing, all varieties must be visually distinguishable. The agronomic conditions and practices are very similar to those of the northern Great Plains.

The Canadian Wheat Board (CWB) is the sole buyer and seller of wheat for domestic food use and exports and is structured very similar to the AWB. The CWB plays a key role regarding quality by setting price differentials. Allegedly they are established to not distort choices (i.e., they are intended to be neutral). However, there is little difference in prices within a grade or protein level. Larger differences exist between grades (e.g., CWRS and CPS). The CWB has been criticized in recent years, which were characterized by high protein premiums, for not transmitting signals for protein over 13.5 percent, but has recently changed its policies. Through its sales operations, the CWB have the ability to sell at higher quality than a contract allows and likely does so intentionally to create "reputation," something not easily executed in a system such as in the United States.

The grading system in Canada is similar to others. However, an important subtle difference is that the factor limits are tighter. Dockage is cleaned at the point of export because of both regulations and incentives for shippers. The incentives for cleaning include tariffs for cleaning of \$2.63/mt (about \$.07/b) plus the value of screenings sold (pelletized) for feed purposes. In a sense this may be termed as a policy for the grain trade since terminal cleaning is a profitable part of grain company operations.

The regulatory aspect relates to the factor limits within the grain standards which are: No. 1 is .4, No. 2 is .75, No. 3 is 1.25 and feed is 5 percent. Thus, like in Australia, there is minimal difference in factor limits between at least the top grades, there is the analogy of a "feed grade" for lots which exceed these fairly tight limits, and significant price differentials are established between these classes. This is distinctly different from in the United States but is crucial to be incentive mechanisms which develop in these countries.

France

The French grain marketing system is perhaps more commercially oriented than any of the others, including the United States. There is a multi-tiered committee structure administered at the national level which licenses varieties for release. The criteria used include: 1) distinguishability; 2) homogeneity; and 3) stability. Important end-use quality criteria include alveograph (a measure of strength). The criteria take the form of a tableau which allows for a tradeoff between yield and quality for licensing purposes. Formally, a variety is licensed by being placed in a catalogue, which is a prerequisite for planting. Despite the fact that a rigid licensing mechanism exists, about 95 percent of the varieties released are private. In addition, the growth rate in productivity has been greater in France than any other exporting country (see Table 2). This growth rate has been achieved without sacrifices in quality (see Wilson and Hill for details).

Trading practices in France are dominated by a highly commercial relationship between buyers and sellers. Contracts have quality criteria and discounts for deviations. It is not uncommon for variety to be specified (or variety excluded) in a contract. The integrity of this is assured in part due to a "variety declaration" by the producer at the point of first sale, and periodic checks by the buyer(s) using electrophoresis. Other end-use criteria used in purchase contracts include limits on zeleny and alveograph values.

The grading system does not make use of "official" grades. In fact, an attempt was made in the early 1980s to institute a system of "official" grades, but they have rarely been used. Instead, all potential factors of importance become part of a contract. In addition, there is not an official agency for conducting inspections. Instead, commercial firms provide this service and competitive pressures assure the integrity of these private agencies which not only provide inspection services, but also supervise origination and ship loading.

Farm policies in the EC (which prevails over France) play a crucial role in providing signals regarding quality. In 1985 the grading system for farm policy purposes was instituted, which includes three types of wheats. These are called quality, bread, and feed, and significant price differentials exist between each. Criteria which distinguish between these are fairly restrictive and include chemical (e.g., falling number, sedimentation, protein, dough test) as well as physical tests. Prior to 1985, wheat prices differed substantially from feed grains. In 1985, the price of what was defined as feed wheat was equated to that of feed grains, with a price differential for non-feed quality characteristics. In 1987/88 these were: feed 170 ECU/mt; bread 179 ECU/mt; and quality 183 ECU/mt.³ The important point is that a type of wheat was defined as feed and its price was equated to that of feed grains (e.g., barley) and significant price differentials were then established for non-feed use. These do not include the developments in durum, which are relatively recent phenomena.⁴

³ECU is the European Currency Unit used in administering the Common Agricultural Policy.

⁴Through the use of differentials in both the farm price (i.e., intervention price) and the export restitutions, the EC has grown to become an important exporter of durum to selected countries.

United States

In light of the paradigm above and the cross country comparisons, salient features of the grain marketing system in the United States are explained with respect to quality. The United States is the only major wheat producer without regulations at the national level for variety release. However, individual universities and private firms exert some control over variety release. The United States is essentially completely dependent on the market to determine success of varieties. The effect of this policy is for less uniformity in end-use performance.

Protein is the only measurable characteristic which at best is an imprecise indicator of quality. Part of the purpose is any licensing or release mechanism in some countries is as a means of categorization--the analogy in the United States is the Class system. Indeed, the current problems associated with wheat classification is a symptom of this problem.⁵ The United States has been dependent on Classes for segregation but increasingly this has become a less reliable indicator of quality.

In the United States, the market for quality characteristics plays a crucial role in allocation. In this market, premiums and discounts are determined for measurable quality characteristics and participants throughout the system (breeder, producer, traders, handlers, and end-users) respond. The dependence of market-determined premiums and discounts is of greater importance in the United States than perhaps any of the competitor countries described above. However, this market does work and is very reflective of the fundamentals of the characteristics market. The data in Figures 3-6 illustrate the behavior of market-determined premiums and discounts in selected wheat markets. In each case there have been important increasing trends in discounts/premiums in past five years--i.e., the market is transmitting important signals. Our results show that discounts for damage have increased five fold in past five years (Clow and Wilson, July 1988). These factor discounts are not easily monitored because they are in fact from individual transactions. However, the behavior of protein premiums (a high profile measurable characteristic) of the past few years is an indication of how well the market does work.

An important point in making comparisons to other countries is that the market only works well for those criteria which are easily measured (e.g., dockage, protein, etc.). There are important problems for non-measurable items (e.g., end-use criteria) for most grains. Other countries have resolved this through some form of regulations over variety release, licensing, and/or variety identification mechanisms within the marketing system. The United States has traditionally relied on premiums and discounts for wheat class and protein quantity for purposes of regulating the supply and demand for these characteristics. Due to inherent problems in use of these, and the apparent inability to develop technology for ease of measurement, there will likely be increased pressure for some form of variety licensing mechanisms and/or use of variety in the market system. This could be implemented in numerous forms, but should generally be viewed as classification by variety, or by excluded variety.

In general, farm policy in the United States has been yield-inducing as administered since the mid-1970's. This is

⁵The problem is that in recent years it has been increasingly more difficult to visually distinguish between wheat of different classes, and visual distinguishability is required for classification in our grading system.

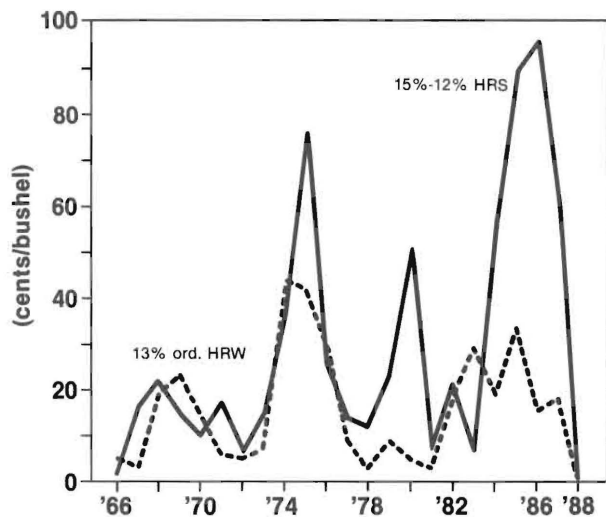


Figure 3. HRS and HRW Market Protein Premium.

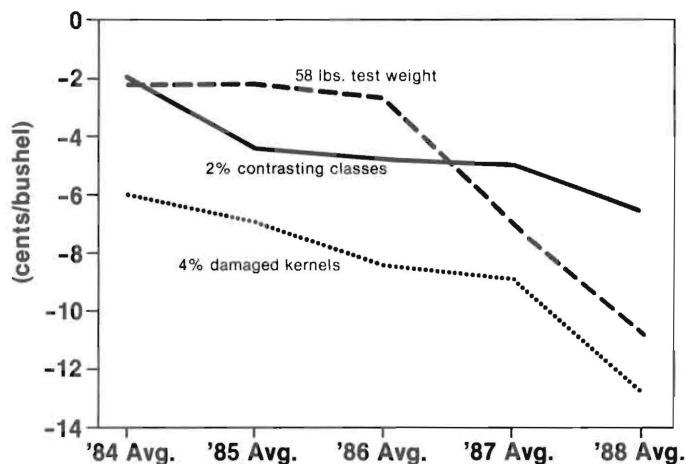


Figure 4. Average Price Adjustment Among North Dakota Country Elevators Durum (#1 HAD).

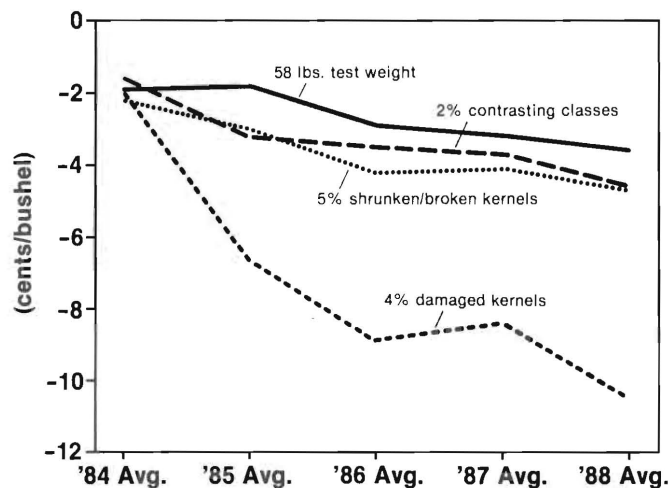


Figure 5. Average Price Adjustments Among North Dakota Country Elevators HRS (#1 DSN) 14% Protein.

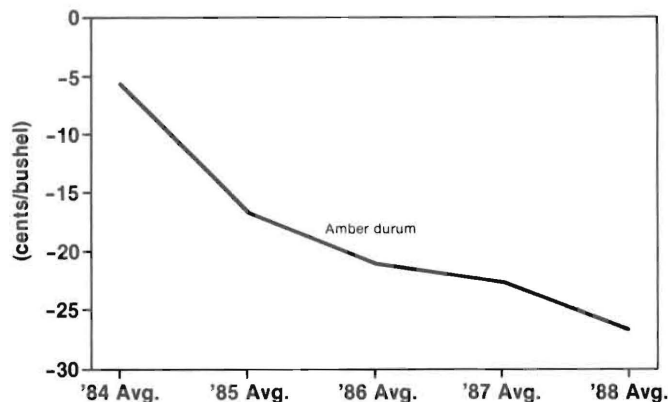


Figure 6. Average Price Adjustments Among North Dakota Country Elevators Durum (#1 HAD).

true for any commodity in which there exists a tradeoff between yield and quality (e.g., yield and protein in wheat). So long as target prices are based on yields, irrespective of end-use quality, this will continue to be the case. A second way in which farm policies in the United States impact quality is through storage. Extended storage, especially at the farm level, seems to be incompatible with preserving quality. The United States is one of the few exporting countries that makes use of such extended on-farm storage. A third indirect impact of farm policies on quality is through farm program premiums and discounts. These are substantially less than premiums and discounts established by the market, are not responsive to market conditions, and generally do not recognize end-use differences.⁶ As an example, the discount for No. 2 wheat in the loan program is \$.02/b, but the market discount could easily be up to \$.10/b for damage (4 percent) alone. The effect of this policy is that the loan becomes the market for poorer quality grains. As a result, the market for characteristics becomes distorted (e.g., feed use of wheat is distorted relative to feed grains). In particular the premiums and discounts as determined by the market are not as great as they would be in absence of the loan program. Changes in this policy would result in more poorer quality wheat being forced onto the market at harvest, resulting in discounts sufficient to find its most-valued use.⁷

In a competitive environment, firms and producers must compete both on price and quality. In comparison to the United States, other countries generally have been more progressive regarding quality. Recall that the OTA survey indicated the least preferred wheat is that of the United States. The short-run implication of this from a United States perspective is that prices (or discounts) are used to move U.S. wheat relative to competitors.⁸

⁶However, at one time a loan rate premium and discount schedule existed for sedimentation values in wheat as well as varieties. See Wilson, Gallagher, and Anderson.

⁷An interesting comparison is that during the period 1955-63 the wheat loan was 152 percent of corn, in 1964-79 it was 120 percent, and this ratio has increased in the 1980s. The point is that through administration of the loan program, wheat has diverged in price from feed grains. It was during years with the lower ratios of wheat to corn loan values that wheat stocks were depleted.

⁸As an example, Heilman analyzed the role of price and quality in the UK wheat market. Using an "inputs characteristics model," U.S. wheats had to sell at up to an 8 percent discount relative to competitor wheats prior to being purchased.

Many of these issues are now beginning to surface at the national policy level. Past policy debates in the United States have generally been on fairly mechanical topics such as dockage, measuring protein on a constant moisture basis, etc., and have pitted farm groups against the grain trade. Though in the future these mechanical topics will continue to be of importance, there are two additional issues which will likely comprise significant attention in the quality debate in the future. One of these relates to variety release or identification mechanisms. Each of the principal competitor countries in wheat have mechanisms for variety release (not necessarily restrictive) and/or use variety extensively at some point in the marketing system. The reason for this is almost surely due to the inability of measuring relevant end-use characteristics in grain standards. The alternative is to somehow incorporate these end-use characteristics someplace in grain standards.⁹ The second topic of debate relates to using farm-policy mechanisms to provide incentives that otherwise do not develop. This would basically be similar to policies existing in virtually all other countries. At minimum, the current distortions could be eliminated.¹⁰ More extreme would be to incorporate incentives for cleaning and other extraneous and indigenous quality improvements within the farm program.

⁹In a recent address to the Millers National Federation Mr. Varne-doe, Chairman of the American Baker's Association said "We need to be able to tell the seed companies what varietal characteristics we are seeking to produce the end products that our flour is going into. And we need to tell the farmers what varieties we want or do not want," **Milling and Baking News**, May 16, 1989.

¹⁰To pick only one example, wheat loan rates in the past were based on a gross weight basis (i.e., wheat plus dockage received the full loan value).

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