The Impact of a New Grading System on the Beef Cattle Industry: The Case of Canada

Jennifer I. Considine, William A. Kerr, Gregory R. Smith, and S. Monica Ulmer

Changes in the grading systems of agricultural commodities will lead to considerable
adjustment costs. In 1972 Canada introduced a change in its grading system for beef.
The period of adjustment for beef producers has been in excess of ten years. The
observed pattern of adjustment for one of Canada's cattle-producing areas is discussed
and the costs associated with the adjustment process estimated. Some measures to
reduce the costs of adjustment are outlined.

Key words: adjustment costs, beef, Canada, grading.

Changes in the specifications for any agricultural commodity's grading system may have an impact on all components of the food chain from consumer through retailer to processor and, ultimately, to primary producers. As well, government regulatory agencies and the suppliers of inputs to both the processing industry and primary producers may be affected. Any change in the grading system may be to the benefit of only some of these groups, while others may incur considerable costs, especially in the short run. One group which will be affected by a major change will be beef producers, yet little work has been done to discern the net effect of a major change in the grading system for such producers.

In 1972 the Canadian government implemented a new beef-grading system. The second section of this study outlines the background to the beef grade change in Canada. In the third section a brief theoretical discussion of grading and grade changes is presented. The effect of the Canadian grading change on the physical makeup of cattle marketings in one of the Canadian cattle-producing regions is reported in

the fourth section, and an estimate of changes in financial returns to producers in the region is presented next, followed by a summary and conclusions.

Recent Canadian Experience with Beef Grading Changes

Until the 1972 Canadian grade changes, grading of beef animals was relatively subjective. Conformation provided the basis of the grading system and, according to the 1958 *Beef and Veal Carcass Grading Regulations,* for Canada slaughter cattle could be categorized as excellent, rangy, angular, or irregular. The regulations utilized such vague phrases as "there is no excess proportion of fat at any weight." The implicit assumption which provided the rationale for the grading system—that there was correlation between consumer preferences and conformation—was never commercially tested (Smith et al.).

This "old" grading system served wholesaling-retailing groups well but provided little value to producers or consumers. In addition, in Canada it was perceived that there had been a change in consumer preferences toward leaner red meat. As the old grading system took no cognizance of the importance of fat cover, retailers could sell as "choice" (the highest

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grade in the old Canadian system), beef which many consumers found excessively fat. Often the excess was trimmed off in the home as waste. The grading system hence created considerable inefficiency as cattle feeders utilized longer feeding periods to put on fat which the consumer did not want and often discarded.

It was producer concerns which set in motion a number of conferences and committee reviews on the grading of beef. Consumer interests as well as all sectors of the beef industry were represented at the 1966 Canadian Beef Improvement Conference. At this conference, three main concerns were discussed:

1) That too many carcasses in the top, choice grade carry surface fat cover that is unnecessarily high in relation to:
   (a) consumer preference.
   (b) requirements for flavor and tenderness in animals of the age now customarily marketed.
2) That the live basis of selling, used at public stockyards, puts a premium on fat cover that is unnecessary and inefficient because the buyer buys on prospective yield and grade, yield being based on the dressed carcass.
3) That the grading system does not look at the fat-lean relationship in the cuts (for example, as measured by the eye of loin and the rib-fat measurements), which may well show that some carcasses are distinctly overfat, or large-boned, but will nevertheless grade choice on the present standard. The criticism implies that grading should in part be based on examination of the rib cut in carcass.

(Proceedings of the Canadian Beef Improvement Conference, pp. 5–15.)

Results from this first conference led to the establishment of an Industry Committee on Beef Grading and Quality. Subcommittees were set up to investigate various matters dealing with grading and quality. One of the first subcommittees investigated factors relating to beef quality. Its report dealt with subjective versus objective methods of grading. The report confirmed that subjective grading did not adequately reflect beef quality. After a considerable amount of further study, a proposal was put forward that a completely new grading system be established which would be based on objective criteria (Smith et al.). This completely objective method was not agreed upon by the meat packers, who felt that some of the subjective methods should be retained. Compromises from both the packers and producers followed in the next few months. The producers were able to get considerations for objective

quality standards, while the meat packers were able to have quality standards relating to rib lean texture, marbling, color, and texture of fat.

Subsequently, a brief prepared by producers and packers was submitted to the Canadian Department of Agriculture. This proposal for a new grading system was basically accepted with minor revisions, and on 5 September 1972 a new beef grading system was introduced in Canada. It was based primarily on objective criteria and its highest grade, A_1, had specifications which were considerably leaner than had been the case under the old grading system. Consumer groups were satisfied that the new system was more reflective of their current tastes.

Clearly, a large number of the major actors in the beef industry perceive that their economic status will be affected by a change in the grading system. However, little formal research has been conducted into either the theoretical or empirical ramifications of such a grade change for particular groups.

Theoretical Implications of a Grading Change

The implementation of a grading system can be viewed as an operational recognition of the hypothesis put forward by Lancaster (1966, 1979) and others (Archibald and Rosenbluth; Lipsey and Rosenbluth) that consumers are not interested in goods "for their own sake but because of the characteristics they possess" (Lancaster 1979, p. 17). Thus, the utility of consumption depends on the characteristics that goods have

$$U = U(c_1, \ldots, c_n)$$

where $c_1, \ldots, c_n$ are quantities of the n characteristics consumed.[1] Each consumer, then, has a vector of characteristics and subjective weights for varying quantities of characteristics. Thus, n can be considered to include all possible characteristics which might be important to consumers.[2] Presumably, grading is an attempt to reduce the cost to consumers of obtaining information on the characteristics

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[1] Characteristics may be either quantifiable or qualitative (e.g., a qualitative characteristic might be seed or seedless grapes).

[2] Any individual consumer may not recognize every characteristic. For him it would have a zero weight.

and quantities of characteristics which any individual good possesses. This is especially important for the heterogenous goods which arise from biological processes such as agricultural production. The cost reduction is accomplished by making an implicit assumption that consumer preferences are relatively homogenous.

This homogeneity assumption allows the vector of characteristics to be standardized. Therefore, only a finite number of characteristics need be considered, so that

$$U = U(c_1, \ldots, c_m), \quad m \leq n,$$

and each characteristic c_i is assumed common to all consumers. Further, standardized units of measure can be established for quantifiable characteristics. Boundaries are then established for each of the quantifiable characteristics.[3] These boundaries provide the operational definitions of the grades. They are of a limited number, v, and should encompass the entire range of values for each characteristic. Thus,

$$G^j = c_1^j, \ldots, c_m^j, \quad j = 1, \ldots, v$$

where G^j indicates the jth grade and the c's indicate an institutionally defined range for each quantifiable characteristic for grade j, e.g., for grade j the characteristic fat cover might range from .3–.5 inches.[4] Consumer choice is thus reduced to an $m \times v$ matrix of information. Further, it is usual for grades to be institutionally endowed with ordinal utility rankings such that

$$U^1 > U^2 > U^3 \ldots > U^v,$$

where the U^js are the utility imputed to each G^j.[5] This is often done by using common qualitative terms to describe grades, e.g., Prime, Choice, Good or A, B, C, etc. In Canada the market is left to establish the price differentials between grades.

The establishment of grades provides information to other participants in the beef industry. Retailers often attempt, through their advertising campaigns, to associate their outlet with high quality by promoting only the top

grades. Over time, retail food chains, especially in Canada, appear to act as if consumer preferences for graded beef can be described by a lexicographic ordering (Encarnacion).[6] Only the two top beef grades are presented to consumers at major Canadian retail outlets. Lower grades (and lower cost grades) are not offered to the consumer on a continuing and consistent basis. Whether this reduction of consumer choice to a small subset of grades is a result of consumers' refusal to purchase anything but the highest grades or firms refusing to supply a larger number of grades is still a point of argument (Kerr 1985). Grades lower in the ordering are consumed by institutions, restaurants, and the processed meat industry.

The establishment of clearly preferred grades provides information to the producer for production decisions. This is especially true when quantifiable limits to the grades are established. In addition, the narrowing of consumer choice likely will lead to an artificial increase in demand for the top grades, thus increasing the price differential received for such products.

The effect on producers of the establishment of a beef grading system can be illustrated by figure 1(a). Here the grading criteria are reduced to one characteristic, fat, for the sake of illustrative convenience. In an ungraded market there will be differential prices for heterogenous products like beef cattle (Kerr 1984). Based on this imperfect information, producers will try to tailor their production to the product which will give them the highest return. Thus, the distribution of product brought to market can be illustrated by distribution $t = 1$.

If a grading system is established which accurately reflects consumer preferences, the specifications for the grade ranked highest in the lexicographic ordering, A, should encompass the mean of the existing distribution. All other grades will be ranked relative to A. Now, given a well-defined objective, producers will change their nutritional, managerial, and breeding practices so that more of their output will fall in grade A. As control over biological

(a)

NUMBER
OF
ANIMALS

F　　E　A　B　C　D

GRADE F = 0 - 30
GRADE E = 31 - 40
GRADE A = 41 - 50
GRADE B = 51 - 60
GRADE C = 61 - 70
GRADE D = >70

t = 2　　　t = 1

10　20　30　40　50　60　70　80

QUANTITATIVE MEASURE
OF FAT

(b)

NUMBER
OF
ANIMALS

F'　E'　A'　B'　C'　D'

GRADE F' = 0 - 10
GRADE E' = 11 - 20
GRADE A' = 21 - 30
GRADE B' = 31 - 40
GRADE C' = 41 - 50
GRADE D' = > 50

t = 3　　t = 2

10　20　30　40　50　60　70

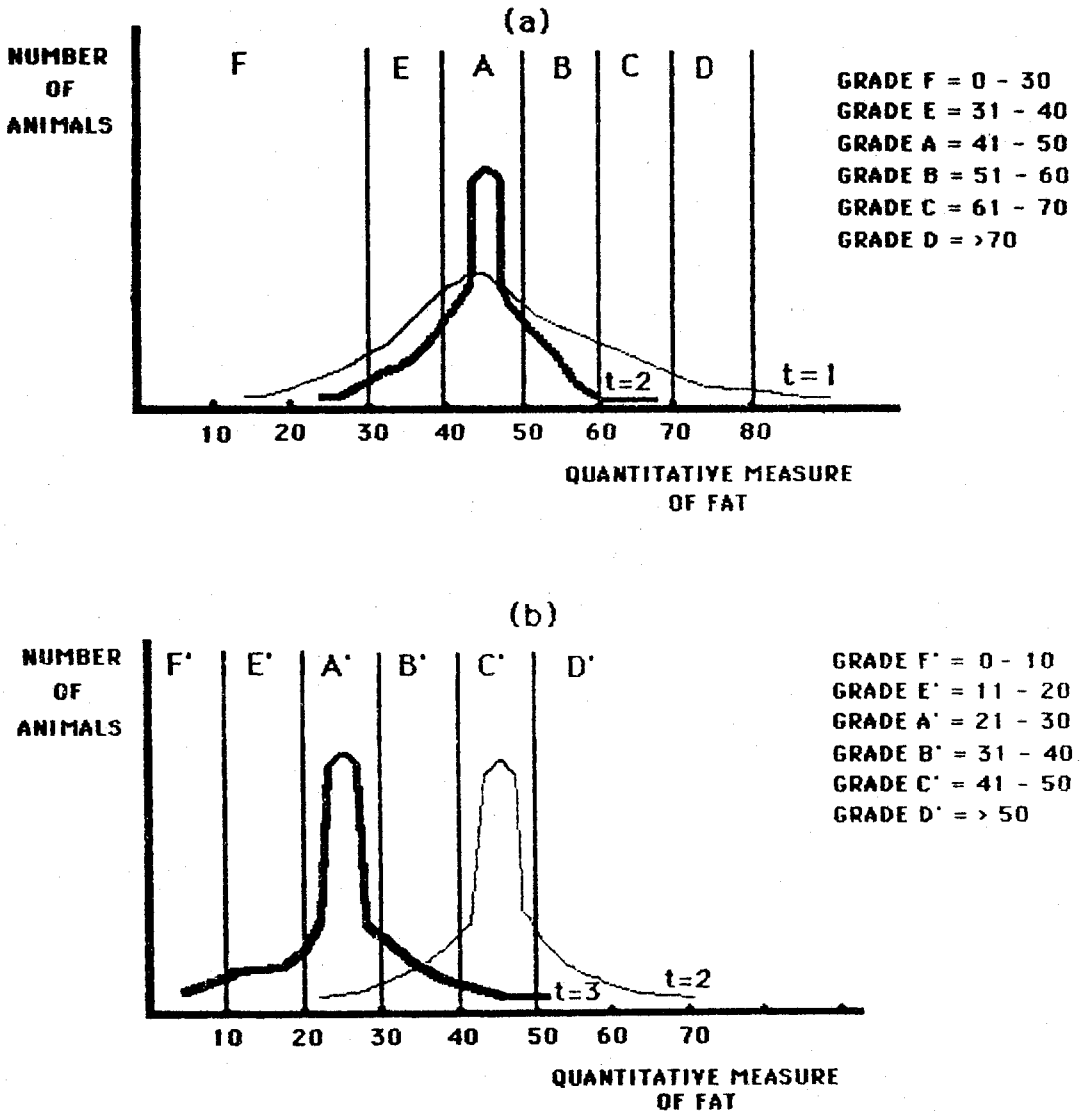QUANTITATIVE MEASURE
OF FAT

Figure 1.　Theoretical implications of a grading change

production is imperfect, some output will continue to fall into lower, residual grades. Over time, however, the distribution of marketings should approach that illustrated by $t = 2$ and will stabilize as the limits on the reduction of production variation are approached.

One of the features of existing grading systems is that there is no automatic mechanism in Canada for reordering grades if consumer preferences change. If retail outlets presented consumers with all the grades encompassing the entire range of characteristics, then no ad-

justment mechanism would be required.[7] As consumer preferences changed, demand for preferred grades would increase causing an increase in their price and more production, the demand for less preferred grades would decline causing a reduction in their price and less production. Given the current combination of institutionally determined rankings of grades and

[7] Unless consumers identify a new characteristic as important, say level of cholesterol, then a grade change is required, i.e., redefining the vector of characteristics from C_m to C_{m+1}.

the lexicographic interpretation of consumer preferences which leads to the generally available choice being restricted to the highest ranked grade, such automatic adjustments do not take place. There has been considerable resistance to grade changes in the past.[8] As a result, grade changes are accomplished through a hearings and review procedure similar to that for changes in public utility rates and hence are subject to the same problems. These have been dealt with extensively elsewhere (Kuhn; Mansell, Wright, and Kerr).

The effect of a grade change on the producers can be illustrated by figure 1(b). Using the same quantitative measure as in figure 1(a), assume that consumer tastes change so that they prefer products with an optimal fat level of twenty-five on our arbitrary scale. If a grading review is undertaken and correctly interprets this change in taste, a new preferred grade would be established, for example A'. All other grades will be defined relative to it, e.g., B', C', D', etc. The producers, who are organized to produce the previous grade A, have product distribution $t = 2$, with the majority of cattle in a now less-preferred grade C' and few animals in the new preferred grade. Clearly, producer net returns will be altered as consumers shift their demands to A'. The producers will attempt to alter their production practices so that their distribution of marketings will move to distribution $t = 3$. Some production practices, like feeding and nutritional procedures, may be changed in a relatively short time; while others, like the genetic makeup of the herd, will take considerably longer to accommodate to the new grading system.

The composition of marketings will change through the adjustment period. Each grade should exhibit an identifiable pattern of adjustment. This can be easily seen from figure 1(b). As the distribution moves from that defined by $t = 2$ to that defined by $t = 3$, grade A' should be strictly increasing in percentage until a new equilibrium is reached. Grade B' should increase at the beginning of the transition period and eventually decline. Grades C' and D' should start out with a high percentage and continue to decline over the adjustment period. Grades E' and F' should in-

crease over the entire adjustment period. If grades were defined on the basis of only one characteristic, the pattern for any particular grade could be discerned a priori. Given that grades are defined over a vector containing multiple characteristics, the patterns of adjustment cannot be identified in advance. It is to this problem that we now turn.

Patterns of Adjustment after the 1972 Canadian Grade Change

To establish the effect of the 1972 Canadian beef cattle grade change, weekly marketings of production cattle in Alberta were examined for the period 9 September 1972 to 4 September 1982.[9] The mean percentage of marketings for the first and last twenty-four weeks of the data period are presented in table 1. The percentage composition of marketings has changed considerably over time. As can be seen from table 2, which compares the current Canadian grades with the previous Canadian grades, grade A_2 is the current grade which corresponds most closely with the previous Canadian premium grade and was the most produced grade immediately after the grade change. Marketings of A_2 cattle have declined as expected, while marketings of grade A_1—the new Canadian grade which is highest in the ordinal ranking—have increased over time. Again, this is expected. The other grades exhibit patterns of adjustment consistent with those suggested in the previous section. This is best illustrated by figure 2, which plots percent of marketings against time for each grade.

The new Canadian grading system, although based on a number of characteristics, was primarily implemented to provide the consumer with a leaner product in the preferred grades. Grade A_1, a leaner grade, clearly increases over the adjustment period. The grades with more fat, A_2, A_3, and A_4, as one would expect, decline over the period. Grade B_1 follows a path of adjustment which at first increases and then decreases. B_1 is underfat. Producers attempting to meet the leaner A_1 standards in the early period were often unable to produce cattle of the correct weight and required fat thickness and the number of B_1s increased. The greater use of "leaner" exotics in the breeding process

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[8] Retailers who are in tune with such changes in consumer tastes may attempt to circumvent the existing grading system. The establishment of in-house grades by U.S. retail chains may be one example of this. Of course, there is considerable risk in attempting this if consumers do look for established grades when they shop.

[9] Grades for residual cattle such as cull beef cows, old dairy cows, and surplus bulls were not considered.

Table 1. Weekly Mean Percentage of Marketings in Alberta by Grade

Grade	24 Weeks Starting 9 September 1972	24 Weeks Ending 4 September 1982
	(%)	
A_1	34.085	56.139
A_2	40.990	31.390
A_3	15.175	6.010
A_4	4.786	.841
B_1	2.147	2.772
B_2	.155	.034
B_3	.028	.005
B_4	.014	.002
C_1	2.620	2.807

allowed for the production of more cattle with the correct age-weight combination (Quan and Kerr), and the number of B_1s declined. Grades B_2, B_3, and B_4 are catchall grades usually composed of animals which miss grades A_2, A_3, and A_4 on characteristics other than fat cover or maturity (fat color, meat color, marbling). As producers became more familiar with the new standards, quantities of animals in these grades declined. Grade C_1 is primarily a catch-all grade for any production animals which do not fall into the A or B grades. C_1 exhibits an increasing and then decreasing path of adjustment. This would be expected during times of uncertainty, when producers are experimenting with production processes in an attempt

Table 2. Comparisons of Beef Grading Systems

Current U.S. Grades	Current Canadian Grades	Current Canadian Specifications Warm Carcass Wt. (lbs.)	Current Canadian Specifications Fat Cover (inches)	Past Canadian (1958–72) Grades
Good	A_1[c]	300–499	.2–.3	Standard
Standard		500–699	.2–.4	Good
		700+	.3–.5	Choice
Choice	A_2	300–499	.31–.5	Choice
Prime		500–699	.41–.6	Good
		700+	.51–.7	
Prime	A_3	300–499	.51–.7	Choice
Choice		500–699	.61–.8	Good
		700+	.71–.9	
Commercial[a]	A_4	300–499	.71+	Commercial Class 3
		500–699	.81+	
		700+	.91+	
Good	B_1[d,e]	300–499	.1–.3	Standard
Standard[b]		500–699	.1–.4	Commercial Class 1
		700+	.2–.5	
Choice[b]	B_2	300–499	.31–.5	Commercial Class 1
Good[b]		500–699	.41–.6	Standard
		700+	.51–.7	
Choice[a,b]	B_3	300–499	.51–.7	Commercial Class 2
		500–699	.61–.8	Commercial Class 3
		700+	.71–.9	
Commercial[a,b]	B_4	300–499	.71+	Commercial Class 1
Utility[a,b]		500–699	.81+	Commercial Class 2
		700+	.91+	
Utility	C_1	Carcasses with less fat than B_1 with Canada B quality		Commercial Class 1
Cutter		Carcasses <300 lbs.		Commercial Class 2

[a] Depends on maturity, yield grade.
[b] Depends on marbling, conformation.
[c] Most of the old Canadian Choice, Good would consist of A_2.
[d] Most B_1 would go into old Canadian Standard.
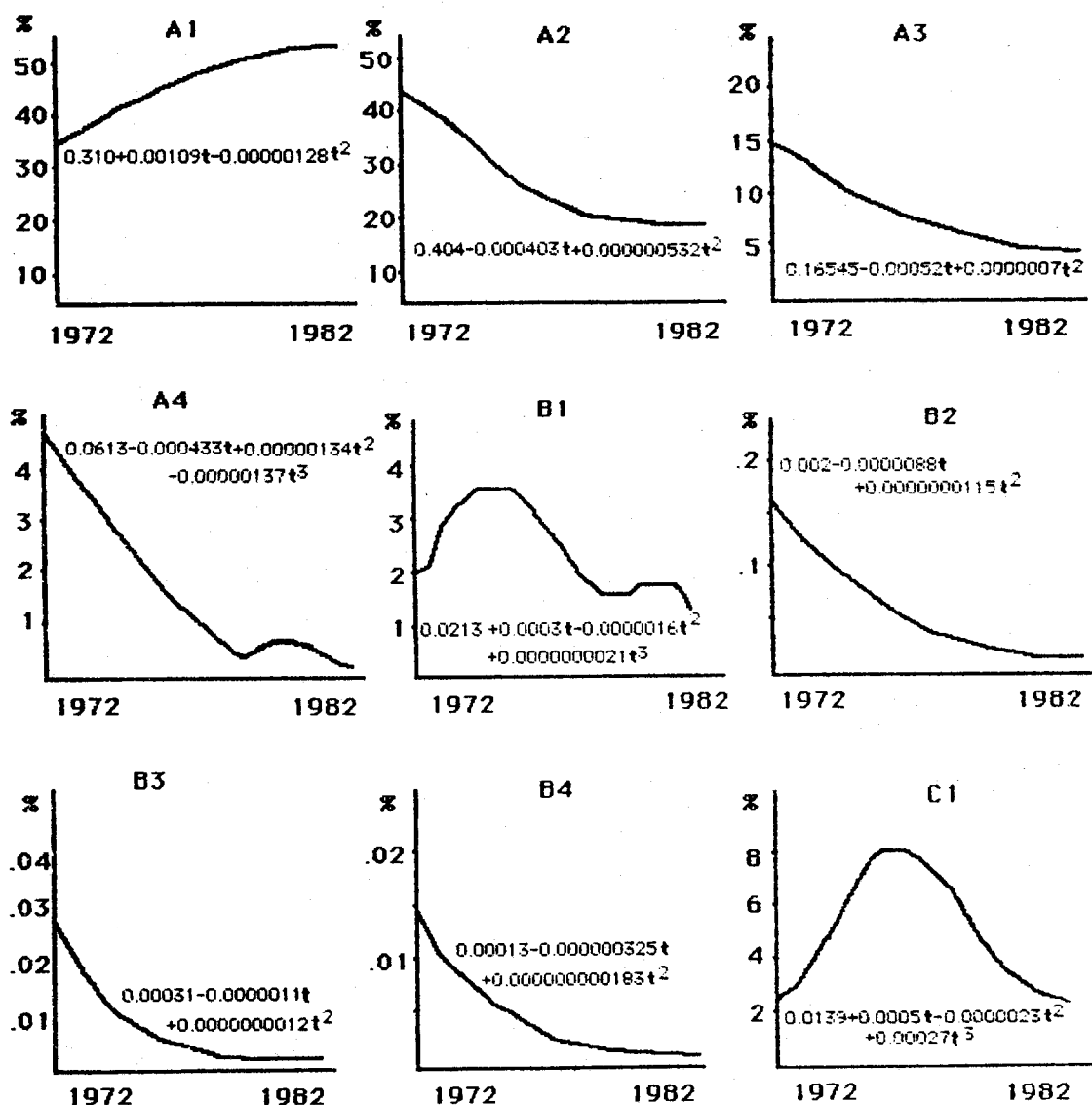[e] Depends on the amount of fat.

Figure 2.   Percentage marketings versus time by grade in Alberta

to market animals which conform to the new grading system. This process of experimentation would lead to more mistakes and hence more animals in C_1. As the process of learning by doing progressed, less animals of this type would be produced.

In order to establish that trends were present, the weekly percentages of each grade marketed were regressed against time. A number of quadratic and cubic specifications were experimented with for each grade, and that with the highest $\bar{R}^2$ value was chosen for each grade.

Since the percentage of carcasses graded each week is clearly not a function of time alone, the statistical results may suffer from problems associated with too few regressors and should be interpreted accordingly. The purpose of the regression, however, was not to discover what percentage of the variation in the "grade percentages" can be explained by time but to determine whether or not specific trends exist through the time period under examination.

Table 3.   Ten-Year Trends in Percentage Marketings by Grade in Alberta: 9 September 1972–4 September 1982

Grade	Intercept	t	t^2	t^3	$\bar{R}^2$
A_1	.310	$.109 \times 10^{-2}$	$-.128 \times 10^{-5}$		.6190
	(31.20)	(12.04)	(−7.33)		
A_2	.404	$-.403 \times 10^{-3}$	$.532 \times 10^{-6}$		.1859
	(65.78)	(−7.18)	(4.94)		
A_3	.165	$-.52 \times 10^{-3}$	$.7 \times 10^{-6}$		.6399
	(31.76)	(−10.98)	(7.68)		
A_4	.061	$-.433 \times 10^{-3}$	$.134 \times 10^{-5}$	$-.137 \times 10^{-5}$	.7154
	(18.92)	(−7.79)	(5.27)	(−4.10)	
B_1	.021	$.3 \times 10^{-3}$	$-.16 \times 10^{-5}$	$.21 \times 10^{-8}$	.3900
	(7.71)	(6.27)	(−7.51)	(7.53)	
B_2	.002	$-.88 \times 10^{-5}$	$.115 \times 10^{-7}$		.1379
	(12.10)	(−5.83)	(3.95)		
B_3	$.31 \times 10^{-3}$	$-.11 \times 10^{-5}$	$.12 \times 10^{-8}$		.1700
	(14.40)	(−5.48)	(3.19)		
B_4	$.13 \times 10^{-3}$	$-.325 \times 10^{-6}$	$.183 \times 10^{-9}$		.0577
	(7.36)	(−1.99)	(.58)		
C_1	.014	$.5 \times 10^{-3}$	$-.23 \times 10^{-5}$	$.27 \times 10^{-3}$	.6630
	(5.80)	(12.35)	(12.20)	(11.04)	

Note: Based on weekly observations.

The regression results are given in table 3.[10] An examination of a plot of the residuals suggests no easily discernible misspecification. In general, the patterns of adjustment conform to those expected from the theoretical discussion, and the percentage distribution of grades appears to be approaching a new equilibrium.

Such large-scale changes in the percentage marketings of various grades should affect producer returns, given that each grade has its own price and cost of production. These changes in revenues are the subject of the following section.

Economic Ramifications of Adjustment

The prices received for beef animals are, in part, a function of the grade received by the carcass. The highest ranked grades have consistently received the highest price, and lower grades are discounted by the market. Hence, the revenue received by a producer is a function of the distribution of his sales among the

various grades. It would seem clear that the revenues received by the industry would differ considerably between the two periods presented in table 1.[11] Previous to the 1972 grade change, marketings of beef cattle appeared to have stabilized with approximately 62% of all animals receiving the old premium Choice grade. As can be seen in table 1, only 34% of cattle received the grade of A_1 in the initial period after the grade change. By 1982 cattle receiving A_1 constituted 56% of all animals. The question arises, then, what was the effect on industry net revenues over the period of adjustment?

Data were available from the *Canadian Livestock and Meat Trade Report* on the sex and quantities of each grade marketed in Alberta on a weekly basis. Average weekly prices for A_1, A_2 steers and heifers and the market-determined discounts applicable to the lower grades were available from the Canfax information office of the Canadian Cattlemen's Association. These prices and quantities were used to produce weekly total revenue figures for Alberta. An estimated break-even price is also produced by Canfax, using a cost of production formula. For the appropriate weeks this was multiplied by the number of animals marketed to approximate total costs. Animals which

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[10] There were, however, clearly defined seasonal trends in the percentages of livestock marketed in each grade which can cause problems of autoregression. If this is not corrected, it will seriously bias the results. At a level of significance of .05, there was clear evidence of autocorrelation in the estimates for grades A_3, A_4, B_1, and C_1, while the test for A_1 was inconclusive. In order to correct for any resulting bias, the Hildreth grid search method was used for these five grades.

[11] The size of the grade discounts will be determined by the relative supply and demand for each grade.

grade A_2 in Canada are, on average, heavier than those in the A_1 grade (28 lbs. for steers, 27 lbs. for heifers, carcass weight). These additional weights were used in calculating the total revenues from animals graded A_2; and industry estimates of the additional costs of feed, yardage, and supplement required for the additional fattening were added to the weekly total costs. For all other grades average market weights were used in calculating revenues and costs.[12] Given the weekly estimates of total revenue and total costs, weekly net revenues for Alberta marketings were calculated.

In an attempt to determine the effect of the 1972 grade change on beef producers in Alberta, two counterfactual arguments are put forward. The question asked in each case is, what would have been the net revenues for the Alberta industry if the grade change had not taken place in 1972 and the existing grades had remained in force over the next ten years? The objections to counterfactual arguments are well known. In this case, however, a number of factors suggest that the arguments would represent reasonable scenarios. First, it can be argued that previous to the 1972 grade change, the distribution of grades within the herd was approaching equilibrium. Percentage marketings of the four relevant Canadian grades— Choice, Good, Standard, and Commercial 1— had varied less than 6% in the four years previous to the grade change (*Canadian Livestock Meat Trade Reports*). In addition, the average percentage discounts for Good, Standard, and Commercial 1 did not fluctuate more than one percent over the four-year period previous to the grade change.[13] Given that the Canadian market appeared to be in equilibrium, it would seem a reasonable assumption that both the grading percentages and discounts would have continued if the grade change had not taken place.

The first counterfactual case might be termed the optimistic case. It is assumed that there was no change from the actual levels of Alberta cattle marketings for the years 1972 to 1982. The current A_1, A_2 prices were assumed to be

equal to those for the pre-change Canadian Choice and the appropriate mean percentage discount applied to obtain prices for Good, Standard, and Commercial grades. As the pre-1972 Canadian Choice grade is fatter than A_1, correlating best with the current A_2, the same adjustments were made to average weight and feeding, yardage, and supplement costs as to the A_2s above. A new set of weekly net revenues was then calculated. These were summed by year and compared to the net revenues from the actual post grade change case above. These are reported as case 1 in table 4.

A second scenario, which could be termed a pessimistic scenario, was also constructed. Case 1 above assumes that the quantity of animals marketed was the same as the number actually marketed between 1972 and 1982. This suggests that there was no consumer resistance to the maintenance of the old grading system. If the grading system did not reflect consumer tastes, one could assume that consumers would begin to substitute, to some extent, to other commodities. There appears to be some evidence of this in the United States. First, in the United States, where the highest grades are similar in fat content to the previous Canadian grades, beef is increasingly subject to industry grading rather than the official U.S. Department of Agriculture (USDA) system. This is especially true in the West (Branson et al.). United States chain stores are attempting to cater to consumer tastes and retain customers. In addition, in both Canada and the United States per capita consumption of beef fell over the period, but the decrease in beef consumption was considerbly less in Canada. Over the period 1972–82 per capita consumption fell 3.5% in Canada (92.5 lbs.–89.2 lbs.) and 9.6% in the United States (115.5 lbs.–103.3 lbs.). Hence, a second scenario was constructed which applied the percentage changes in United States consumption to Alberta marketings. These were adjusted for changes in herd composition necessary to achieve the required reduction in herd size. The results are reported in case 2 in table 4. This can be taken as a worst case scenario, as it attributes all of the decline in per capita consumption of beef to consumer dissatisfaction with the grading system. Clearly, the relative prices of substitutes (especially poultry), changes in the growth rate of income, and changes in tastes (concerns over fitness and cholesterol, etc.) will also affect the consumption of beef (Moschini and Meilke).

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[12] Although some of the other grades may contain overfat cattle, it is assumed that there was no conscious decision to produce such animals and that they are true mistakes. The production of A_2s may be a conscious decision given either relative feed to slaughter cattle prices or short-term market holdbacks to take advantage of an expected improvement in market prices.

[13] For good steers 1.0%, good heifers .3%, standard steers .5%, standard heifers .9%, commercial 1 steers .7%, and commercial 1 heifers 1.0%.

Table 4.   Estimated Changes in Net Revenue as a Result of the 1972 Grade Change

Year	Case 1		Case 2	
	Total Difference in Net Revenue[a]	Average Value/Head	Total Difference in Net Revenue[a]	Average Value/Head
			($)	
1972[b]	−3,739,010	−21.84	−3,739,010	−21.84[c]
1973	−14,815,700	−15.75	−6,376,960	−7.21
1974	−17,760,000	−20.01	−15,764,200	−18.50
1975	−16,247,200	−15.28	−7,429,530	−7.85
1976	−10,467,700	−8.35	−8,971,850	−7.95
1977	−18,241	−.01	4,223,880	3.43
1978	−3,079,070	−2.58	5,010,260	4.54
1979	52,097,800	49.41	57,848,700	57.15
1980	39,027,100	36.94	45,040,200	44.88
1981	28,414,800	26.75	26,764,200	27.09
1982[d]	32,087,500	39.97	33,981,800	45.51

[a] In Canadian dollars; at time of writing, $1 Can. ≃ $.75 U.S.
[b] Final ten weeks only—grade change implemented 1 Sep. 1972. A 5-week adjustment period for initial confusion to settle down was allowed for and no data utilized for that period.
[c] No quantity adjustment assumed for 1972.
[d] First thirty-six weeks only—data collected to 10 years after the grade change.

Case 1 and case 2, we believe, represent the range of values within which the effect of the grade change should lie.

As one would expect, given the relatively long period required to adjust production to the new grading system, in the initial period after the grade change, there was a reduction in net revenues for producers. Over time, as producers were able to adjust, the new grading system provides for an increase in net returns to the industry.

It should be noted that the Alberta industry is one of the most progressive in Canada (Kerr 1982), and adjustment may have been more rapid than in other areas. Data from three other provinces—Saskatchewan, Ontario and New Brunswick—were originally examined; and, although not sufficiently complete to conduct extensive analysis, it did clearly indicate that the process of adjustment was occurring at a slower pace than in Alberta. Thus, the reduction in net revenues may be larger and extend for longer periods in other areas.

One of the clear implications is that similar costs of adjustment will be evidenced as long as grading systems in the same form as those presently utilized, are established. It is unrealistic to expect that the relative weightings imputed to commodity characteristics by consumers will remain constant over time. For that matter, it is unlikely that the technology available to measure such characteristics will remain static. This will lead to periodic changes to the grading system over time and hence the

associated costs. This will persist as long as grading systems provide an institutionally determined ordinal utility ranking which provides the incentive for retailers to associate themselves exclusively with the highest grade(s) in the utility ranking. This builds in an incentive to resist grade changes. Such delays are likely to result in more costly adjustments when, inevitably, the grade must change to more closely conform to consumer tastes.

If new grading systems are established, then they should not be constituted so as to convey ordinal rankings.[14] They should provide information to consumers about the characteristics of the product so that the consumer can choose the product he desires. Although this would require a greater effort by consumers to understand the grading system, it would allow for less dramatic adjustments as consumer tastes change. In other words, consumers would express their preferences for beef with different amounts of the characteristics by purchasing more of that product. Changes in relative prices would provide the signal to adjust production. Adjustments would be far more gradual. This would also provide the flexibility to allow for differing patterns of adjustment in consumers' tastes by, say, region or age group. If new characteristics or better information were required by consumers, these could be integrated into the existing grade categories. Certainly, any

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[14] This may be easier said than done. For a more complete discussion of the problem see, for example, Farris or Erdman.

proposed grade change will impose costs upon the industry. The important lesson to be learned from the Canadian experience is that it may not be wise to replace one fixed, ordinally ranked grading system with another. Any new grading system should avoid such inflexibility. Canadian cattlemen, one can be quite sure, will be asked again in the future to bear the costs of adjustment when the current system eventually becomes inconsistent with consumer preferences. As the United States is currently debating changes to its grading system (Branson et al.) there may be an opportunity for the establishment of a more flexible and less costly system.

Summary and Conclusions

As presently constituted, grading systems have no automatic adjustment mechanisms. Hence, when consumer preferences change over time, the need to reconstitute the grading system arises. Often there is considerable resistance to such changes from various members of an industry. In the beef cattle industry, one group which must adjust are cattle producers. Little was known, however, about the time necessary for adjustment or its costs.

In Canada the beef grading system was changed in 1972. The adjustment in the province of Alberta appears to have required approximately ten years, and the short-run costs were considerable. Over the longer run, however, the change appears to have been beneficial to cattlemen.

Given that the adjustment period is lengthy and in the short run costly, there should be considerable effort made when new grading systems are established to ensure that they incorporate sufficient flexibility to allow for gradual adjustments to consumer tastes. As a first step, those who establish grading systems should consider discontinuing the practice of assigning ordinal rankings to grades. Consumers can still be informed about the quantities of characteristics which the meat they are purchasing includes. The consumer himself can then best decide which set of characteristics best suits his taste. This would eliminate much of the need to change grading systems and hence the long and costly effort required to change them.

[*Received March 1986; final revision received July 1986.*]

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