Beef Carcass Grading: The Common Language of the Industry

Beef Carcass Grading in Canada

A Review

By C.A. Gracey

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An outline of the history and present status of beef carcass grading in Canada. This document discussed the early concerns with poor quality that gave rise to the original standards, the developing problem of excess fatness in the 1960's and the two subsequent changes that were made in the standards in 1972 and 1992. This outline also mentions the creation of "standardized procedures in packing plants" instituted in the late 1960's and the privatization of the grading delivery system in 1996. The outline concludes with some comments on future changes needed to benefit the industry and its producers. These changes include computer assisted grading, balancing the focus on Quality and Yield and flowing carcass grade and yield information back through the supply chain to commercial and seed stock breeders.

INDEX

Personal Experiences and Context

Perhaps the issue that interested me most constantly throughout and after my career has been the issue of beef carcass grading. In the spring of 1958 an old Department of Agriculture hand named Al Currie visited a few of my fellow Animal Husbandry graduates to offer us jobs as graders of beef, hog and lamb carcasses. Though we had been instructed in the impropriety of showing too much interest in starting salaries we eventually got around to it and were a bit underwhelmed to learn that the starting salary was $4,200.00 per annum. That wasn't bad but neither was it great. Word had leaked out that a fellow classmate had just landed a job with a major advertising firm in Toronto for the princely sum of $5,000.00 per year and we felt every bit as worthy.

In any case, Mr. Currie held out the prospect of a job grading hog carcasses in Saskatoon but I had pretty well decided to pursue a graduate degree by then. One of my classmates did accept employment and continued as a grader and senior grading official for his entire career.

Another incident occurred during the late autumn of my third year at the Ontario Agricultural College. It was announced that the Champion Steer from the aptly named "Chicago International Fat Stock Show" was such an impressive creature that it was being brought to be displayed at the Royal Agricultural Winter Fair and was to make a stop at the OAC. The steer was named PS Troubadour and it was a Shorthorn. It's hard to believe now but the Shorthorn was, at that time, the dominant beef breed, at least in Ontario. Having been schooled in the fine art of livestock judging, this was a command performance and we were expected, as well-trained livestock judges, to lay our hands on this marvellous beast. I was able to find a photo of this steer on the internet and have inserted it below

PS Troubadour – Grand Champion Steer Chicago International Fat Stock Show 1956[1]

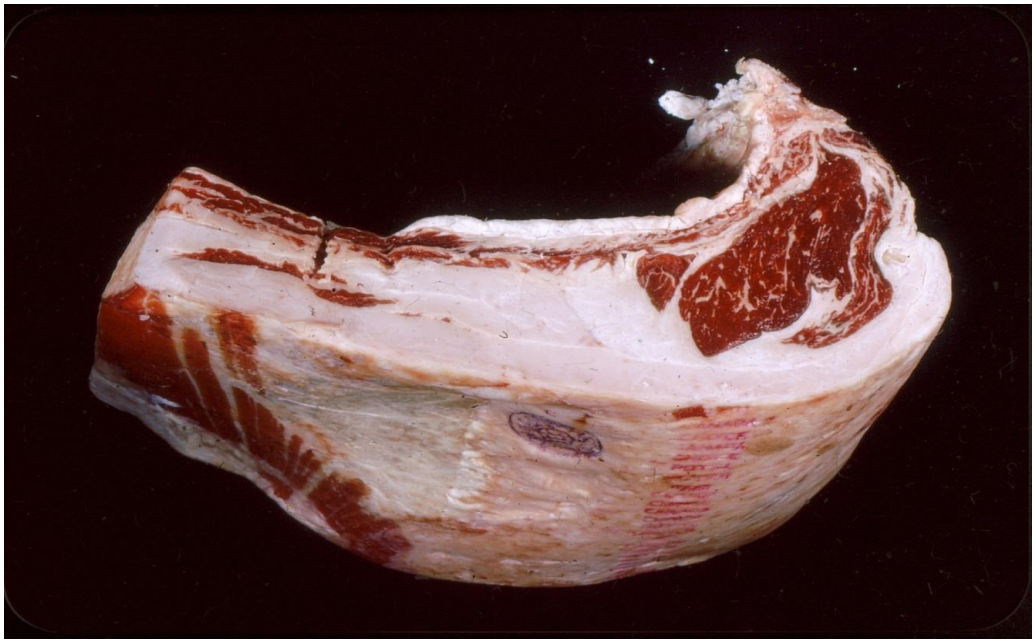
When I finally became more directly involved with the beef industry as an employee of the Ontario Department of Agriculture, as it was then known, I became aware of some emerging unrest with the existing beef carcass grading system. I didn't know from what angle this concern arose but soon learned that an "heretical" individual named Dr. Roy Berg of the University of Alberta was making waves by discussing such novel ideas as crossbreeding. He was even suggesting that the grading system should also be changed because many of our "Canada Choice" carcasses were simply too fat. This view resonated with me because I was becoming aware of meetings between producers and packers about the same issue. The big question in those days was, "How much fat is enough?" This became a tiresome and endless discussion. If one were to read the grade standards of the day the Choice grade called for *"...a uniform and smooth fat cover over the entire carcass".* It was the common view that a substantial fat cover was necessary to protect against carcass shrink caused by moisture loss. Furthermore, a substantial fat cover was considered necessary to ensure a high-quality product.

The other issue that came early to my attention was the understanding that it took about two and a half times as much energy to put on a pound of fat as to put on a pound of lean and that feed efficiency declined as an animal increased in weight. An article that has been in my files since it was printed in 1968 called, "The Cost of

[1] Photo from " History of the Department of Dairy and Animal Science, Penn State College of Agricultural Sciences

Feeding to Heavier Weights" by John Larson and Robt. Rizek of the Economic Research Service of the USDA points out that as cattle gained from 650 to 1150 lbs the cost of gain rose from $15.00 to over $40.00 per cwt. or approximately 166%. We were also starting to hear from people like Dr. Roy Berg from the University of Alberta and US meat scientists like Dr's Briskey, Bray and Bridenstien about the excessive cost of over-finishing cattle. I often wondered why all the great meat scientists had surnames starting with a "B but of course we had our own experts named Dr. Howard Fredeen, of the Lacombe Research Station, Dr Charles (Red) Williams of the University of Saskatchewan and Dr. Ron Usborne, who came from the USA, of the University of Guelph. Each of these experts, including Dr Roy Berg contributed importantly to the science underlying the grading debate.

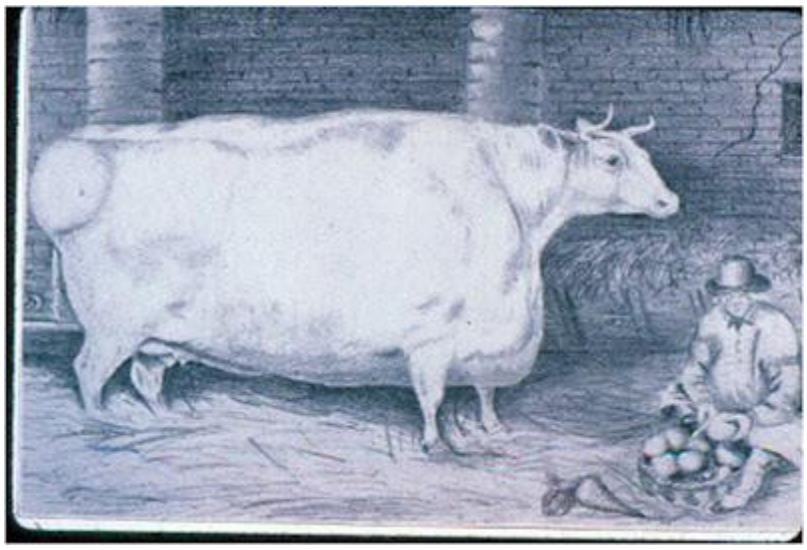
It was during this protracted debate about "how much fat is enough?" that I had my own epiphany. I am not sure of the year but it was either 1967 or 1968 when my boss Hubert McGill and I were watching the judging of the champion steer classes at the Royal Agricultural Winter Fair. All of the steers, especially the winners and higher placed animals reminded me of PS Troubadour and I recall suggesting to my boss that it would be interesting to see the carcasses of the champions. This seemed possible because, following showing, the steers were to be loaded out and shipped to Canada Packers on St Clair Avenue for slaughter. Hubert McGill was the Livestock Commissioner for Ontario and he and I both knew the Beef Plant Manager at CP, a wonderful man named Dean Iler. We expressed our wishes to Mr Iler and he tentatively agreed. However, when we called the day after slaughter to arrange to visit the cooler Dean Iler demurred. Pressed for a reason, he finally allowed that several of the carcasses were so over finished that they had decided to bone them out. Whether this was an excuse or a valid reason I could not judge but what stuck with me was that the carcasses were grossly fat. This drove home the point to me that most of the show ring concepts about the ideal steer were utter nonsense. The show ring too often mirrors the fanciful fads of the day and follows rather than leads. I have reproduced below a photo I took in the late 60's of a rib section that was all too common in those days. Note by the red ink that this carcass was graded Choice.



The fallout of this incident nearly ended my career. At the time, I was responsible for the newsletter of the newly formed Ontario Beef Improvement Association; then a body sponsored fully by the Ontario Department of Agriculture. I wrote most of it myself and, following this experience wrote a piece stating that *"…. some of the worst steers in Canada were paraded around the show ring at the RAWF last month".* This admittedly provocative remark enraged many breeders and all showmen and simply amused commercial producers. But the focus was on over-finish which was already under active discussion so I survived, if barely.

Interestingly there is a sidelight to all of this that I pause to recount. One of the subjects we "animal husbandry" students were taught in that far off decade was "Breed History". This was before the area of study was renamed "Animal Science" and the subject of breed history was largely a waste of time. However, it did introduce us to the mainly British breeders who experimented with line breeding in the 18th and 19th century in efforts to create distinct breeds. Perhaps the most renowned of these was Robert Bakewell (1725-1795) who practiced selective breeding on cattle, sheep and horses and is often referred to as "the father of modern animal breeding". In any case, the main thrust of his efforts with cattle was to transform them from their original purpose as draft animals to also produce higher quality beef. In those far-off days fat or "tallow" was often at a premium to lean. Fat was needed for soap making, as a fuel for smoky candles and lamps and generally to "grease the wheels of industry" in the centuries before fossil fuels were

discovered in abundance. That is why livestock shows were called “Fat Stock Shows”. That is why “The White Heifer That Travelled” (see the exaggerated depiction below) was so renowned in her time. This heifer was a “freemartin”, meaning she was twin to a male and thus infertile, so she was fed for slaughter. She allegedly reached 2,300 pounds and was put on display for her extreme and valued fatness.



The lesson here is that what may once have been prized for its economic value, in this case tallow, became ingrained as a show ring ideal and lingered as tradition long after its original economic importance had disappeared.

I inserted this anecdote, not only for its historical interest but also because it reminds one that the tendency to resist change – or to preserve tradition—remains impressively strong in the modern cattle industry.

Standardized Procedures in Packing Plants

As a prelude to discussing grading issues in more detail I must refer to a very important development with which I was closely associated, and which is closely related to the grading function. This was the establishment in Canada of a system of "Standardized Procedures in Packing Plants". This occurred in the late 1960's when I was still employed by the Ontario Ministry of Agriculture and its origins are of considerable interest. Here is how that came about.

In the early to mid 1960's there was, especially in Ontario, growing interest among many producers in selling cattle on a "carcass weight and grade basis". This interest was fairly wide spread but was especially intense among a group of cattle feeders and breeders in South Western Ontario who had formed an Association called "the Red Triangle Association". This group of forward thinking cattlemen was primarily interested in Angus cattle and believed that they would be better off selling their cattle directly to the packer of their choice on a carcass weight and grade basis. The packers for their part were happy to take delivery of superior cattle that met the more exacting criteria of the Red Triangle Association. The approach was successfully launched and other producers, not directly involved with the Red Triangle Association began experimenting with direct to packer sales.

The single and glaring impediment to such a marketing method was that there was no protocol or system to govern and oversee the carcass weighing and dressing procedures inside the packing plant. As a strong advocate and promoter of carcass weight and grade selling, I recognized the need for a system to build confidence in the carcass weighing and carcass dressing procedures. Fortunately, the packers, led by the manager of the Canadian Meat Packers Association, Mr Keith Leckie, had an equally keen interest in removing doubt and suspicion about these processes so we worked together to devise a set of procedures that came to be known as "Standardized Procedures in Packing plants".

We did this by creating a set of draft regulations in Ontario that were later introduced as a component part of grade regulations at both the Provincial level and later in the Federal Grading Regulations.

The first step was to define a carcass of beef. There was at the time no regulation specifying the precise point at which the head, the fore and hind legs or the tail

were removed and no regulations governing how a carcass was to be trimmed either externally or from the interior of the carcass. It is easy to see how variation in these practices between plants would make it impossible to compare bids since such variation could significantly affect the pay weight of carcasses to the disadvantage of sellers.

Keith Leckie recalled that during WWII a "War Times Prices and Trade Board" had been established and that a definition of a beef carcass had been set out to facilitate the filling of contracts for Canadian troops. We adopted that definition and attached to it further specifications to define permissible carcass trimming.

We were also aware that carcass scales, though checked for accuracy occasionally by Weights and Measures authorities, were not checked or calibrated on a daily basis. There was also a lack of standardization concerning whether the carcass was to be weighed before or after washing and no standardization of the weight of the pulleys and gambrels on which the carcass was supported. All these sources of variation were standardized and the authority to provide daily and even more frequent oversight and enforcement was vested in the grading service.

This proved to be a very popular and widely appreciated innovation. It strengthened producer confidence in carcass weight and grade selling and, no less important, removed a source of distrust between producers and packers. It is proper to note that, aside from isolated incidents, there was no apprehension that packers were not to be trusted. Indeed, in my experience much can be said about the probity and integrity of the great majority of plant operators. They could be expected to drive a hard bargain in price negotiations, as could the seller, but once the deal was made plant operators could equally be expected to fully honour the agreement. But a system of standardized procedures was still necessary to ensure uniformity of practice and to fulfill the sound business adage, "Trust but Verify".

These procedures came into effect in Ontario in 1968 and were soon thereafter adopted in all plants that had Federal Grading. A copy of the definition of a carcass has been a part of the Grade Standards regulations since the late 1960's and is inserted as Appendix 2.

In the discussion that follows I will refer to the three most recent set of beef carcass grade standards: those that existed before 1972, the grade standards that applied

from 1972 to 1993 and the grade standards that have been in place since 1992. I will conclude by outlining some important changes that I believe should be made to the present standards. But before focussing on recent standards a brief history of beef carcass grading will provide some needed context.

A Brief History of Beef Carcass Grading in Canada

Most of the credit for the content of this section goes to John Ross of Agriculture Canada who provided me with an archived copy of "Pub. 962, Beef and Veal Grading in Canada revised July. 1959" by H.J. Maybee of the Livestock Division of what was then the Canada Department of Agriculture. In this section, I quote freely from Maybee's work.

"The grading or marking of beef according to quality provides a standard basis for buying and selling in all transactions from the producer to the consumer and permits each quality to find its proper level according to general acceptability."

This observation is akin to one I have used in many presentations where I refer to the grade standards as, "the common language of the industry."

Maybee refers to producer concern that, *"…there was not sufficient incentive for the finishing of high quality beef …".* He notes that it was the producers themselves, working through a national body called "The Joint Beef Committee" that began an effort in 1927 and 1928 to first study and then to draft tentative specifications for the proposed grades. That committee was made up of producers, the trade and federal and provincial Departments of Agriculture. This led to a conference in Winnipeg on June 28th and 29th of 1928 where a report from the committee, *"… recommended to the Canada Department of Agriculture that an official system for grading and branding beef be established."* The report noted that there was not enough high-quality beef to reach the consumer since the best quality western beef was being exported to the U.S. while the better-quality beef in Eastern Canada was going to the Hotel and Restaurant trade. It was also noted that the *"…spread in values between finished and unfinished cattle was too narrow."*

The new grading service was inaugurated on Sept. 29th ,1929 and there were just two grades; "Choice" and "Good". The brand marks were "Red" and "Blue" respectively. Grading was, and remains, optional but if carcasses were graded and branded it had to be done in accordance with the new standards.

Between 1931 and 1945 the tonnage of graded and branded beef quite rapidly grew from 17.3 to 178.1 million pounds with approximately 40% of the product graded Choice in 1945. Since average carcass weights were approximately 525 lbs one can infer that in 1931 only about 33,000 carcasses were graded and this grew to about 320,000 carcasses in 1945. The beef cow herd in 1945 numbered 833,000 head and a beef herd of this size would have produced about 560,000 marketable steers and heifers. This means that by 1945 roughly half of the steer and heifer carcasses were being graded.

Interestingly there were three grading systems in existence in the 1940's. British Columbia had launched a provincial system in 1938 which corresponded closely to the National system, except that BC made it mandatory that all beef sold at retail within the greater Vancouver area had to be graded. Also in 1943, the "Wartime Prices and Trade Board" introduced price controls on all "red brand" carcasses weighing 375 lbs or more and also set up specifications[2] for beef carcasses supplied to the armed forces and for beef that was to be exported to the UK by the WPTB. This is mentioned here only because, according to Maybee, *"The growing multiplicity of grading systems for beef began to be confusing and a single schedule of National grades was deemed highly desirable."* The stated objective was, *"… to devise a system of grades suitable to indicate quality to the consumer, and useful as the basis of settlement to the producer if and when the buyer and seller elected to conduct transactions on the carcass basis----."* One is impressed at the foresight and leadership here because carcass basis selling was not at all common in the mid 1940'.

This new national standard came into being by regulation on Oct. 1, 1947 and provided for the following grades;

- "A" (Choice Steers and Heifers)
- "B" (Good Steers and Heifers)
- "C" denoting Commercial (Medium Steers and heifers)
- "D1", Utility (Common Steers and Heifers)

[2] See earlier reference to the definition of a carcass

- "D2" (Good and Top Medium Cows)
- "D3" (Low Medium and Common Cows)
- "M" for Manufacturing, (Canners and Cutters, Cows and Bulls)
- "S" for Stags (Bulls and Stags).

Then in 1958 a new standard was introduced and remained substantially unchanged until the next major change that occurred in 1972.

It should be noted that prior to the advent of feedlot finishing the cattle arriving at market were far more variable as to maturity, quality and weight than present offerings. In particular, there were, in the earlier years, many intermediate aged cattle that fell between the youthfulness required for Choice and Good carcasses and the more mature cow classes. This was reflected in the grade standards and in the verbiage. For example, here is a description for the grader of a *"Heifery Cow"* – *"As compared with heifer may be more angular, less meat to bone, loin somewhat flat, dished rounds, prominent hock bones."*

The Pre-1972 Standards (1958 to 1972)

The Grade Standards in the several years prior to 1972 provided the following grades for youthful or "Maturity 1" cattle;

- Canada Choice
- Canada Good
- Canada Standard
- Canada Commercial Class 1

The Canada Choice grade called for a carcass that "*… has excellent conformation, finish and quality, relatively blocky, heavily and uniformly fleshed, the neck short and thick and the shanks fully muscled with the external surfaces covered with firm fat"* . The standard stated that, *"… the degree of finish may increase with the carcass weight but there is no excess proportion of fat at any weight".*

I have searched the standards in vain to see if there was any clear definition of what constituted an “excess proportion of fat”. However, there was a grade slot (Canada Commercial–Class 3) for carcasses considered to be “overfat and wastey” but again there was no definition of either “overfat” or “wastey”. However in 1971 only 1.3% of the carcasses were graded Commercial-3. This suggests that the idea of “overfat” and “wastey” was pretty extreme.

The grades for Maturity 2 or carcasses from intermediate aged cattle were Commercial 2, Commercial 3 and Utility 1. There was some discussion at the time that the maturity 2 or intermediate age grades could be eliminated. The number of carcasses in these three grades had been declining steadily and in 1971, the year before the 1972 grade change, these three grades combined contained only 3.7% of the carcasses that were graded.

The Maturity 3 group of grades were for cow carcasses, Utility 2, Utility 3 and Manufacturing. And finally there was a grade for bull carcasses.

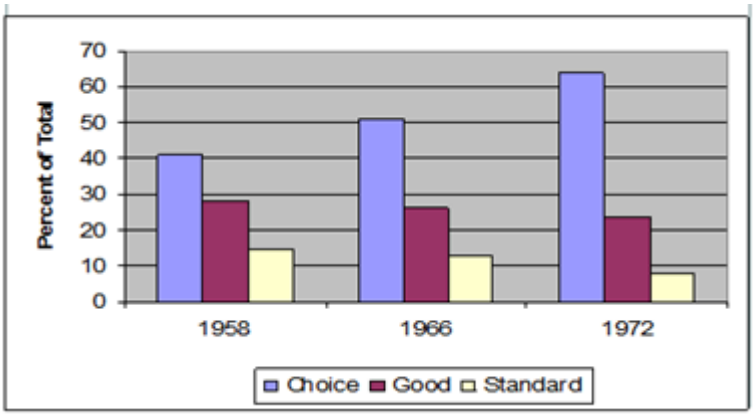
The degree of imprecision in the language and subjectivity in the grade standards of that time is all too apparent in the above short excerpts.

In those bygone days the feedlot industry was in its infancy and many fed cattle reached market pretty close to their third birthday. This was so because a calf destined for slaughter usually spent its second summer as a yearling at grass and was put in a feedlot in the fall and fed for several months before being considered ready for slaughter at about 24 - 30 months of age. In other cases some ranchers even preferred to keep the cattle for a third summer at grass.

An indication of the growing problem of excess finish may be inferred in the display below which shows the remarkable increase in the proportion of “Canada Choice” carcasses from 40% to over 60% in the 14 years between 1958 and 1972, and in the associated decline in the proportion of “Canada Good” and “Canada Standard” carcasses. I use the word “inferred” here because it is not a given that increased fatness led to a higher quality grade. But it can be inferred from the wording of the grade standards, and from the debate that was raging over excess fatness, that this was indeed the case.

It might also be explained that the period from 1958 to 1972 generally bracketed a period of rapid feedlot expansion and therefore increased grain feeding. Also the great majority of cattle were sold live at auction and fatter cattle had a higher dressing percent and cattle buyers were generally evaluated on the "cost" of the dressed carcass. For example, to use prices extant in 1960, a steer that was sold for $25.00/cwt on the hoof had a carcass cost of $43.85 if its dressing percent was 57% but only $40.98 if it dressed at 61%. The producer was generally unaware that he had incurred the extra cost of producing an over finished animal for the illusion that his cattle "topped the market" on account of an expected high dressing percent.

Grade Distribution 1958-1972



Eventually the conviction grew that it might be appropriate to change the grading standards to at least a minor degree in order to de-emphasize fat. But who would lead or champion such an undertaking? And would the changes be minor or more extensive?

In 1970 the Canadian Cattlemen's Association was just on the point of being revitalized. Its predecessor, "The Council of Canadian Beef Producers" had been all but moribund but dedicated individuals like Gerard Guichon from BC, Ross Beattie from Ontario and the CCA, Manager Fred Newcombe from Calgary and others had kept the idea of a national organization alive seeking the day when it might receive funding sufficient to undertake more ambitious activities. That day arrived when a per head check-off, which already existed in BC, was introduced in Ontario in Sept 1968 and shortly thereafter in Alberta. This provided the source of funding not only for Provincial organizations but for the CCA as well. The CCA's budget in 1970 was $80,000.00.

I had been very fortunate in being hired in 1970 as the new manager of the CCA and the organization was looking for issues relevant to the betterment of the cattle industry. This was a good fit for me because I had been an advocate for a grading change while still employed by the Livestock Branch of the Ontario Department of Agriculture. I was also, by then, a disciple of Roy Berg and an avid reader of the work of the afore mentioned US meat scientists.

The 1972-1991 Grading Standards

Thus, an effort began in 1969 to revise the beef carcass grading system. The lead player in this effort was the Canadian Cattlemen's Association, whose Board at the time was dominated by commercial producers. Interestingly many breeders were sceptical if not outright opposed to change. This was the era of the rapid increase in importations of European breeds and some breeders of the established "traditional breeds" were convinced that the idea was being pushed by breeders of "exotic" cattle. There may have been some truth in this allegation but, if there was, the pressure for change was beneficial. The Canadian Meat Packers Council, now the Canadian Meat Council, was guardedly in favour of modest change as was the Livestock Division of Agriculture Canada. But neither favoured the degree of change being advocated by the commercially minded CCA. Retailers were also highly sceptical of the changes proposed. Heavily finished carcasses were sought by most retail meat buyers and in those days the head beef buyer of each major retail chain would visit packing plant coolers daily to select the carcasses and have them stamped to their own account. They did not bear the direct cost of excessive fatness and generally considered heavy finish as a further assurance of quality.

Undoubtedly it was the intense debate that determined the outcome. It was decided, whether consciously or otherwise, that the grade standards should be "descriptive rather than prescriptive". Recall that the existing grading system had grade names of Canada Choice, Good, Standard and Commercial and, quite obviously this suggested a ranking of quality. The decision was made by the Federal Government to abandon this terminology and adopt an "A"," B" and "C" nomenclature. I was never sure that this was any less "prescriptive" than Choice Good and Standard but it seemed a necessary compromise. Grades "D" and "E" were established for Cow and Bull carcasses to replace the old terminology or "Canners" and "Cutters".

The “Canada A” and “B” grades were for “Maturity 1 carcasses” and these were carcasses that were determined to be under approximately 30 months of age as assessed by the degree of bone ossification. The "Canada A" grade was then divided into four divisions based on fat thickness. It was understood that the A grade series would capture virtually all of the carcasses that had graded Canada Choice, Canada Good or Canada Standard in the previous system, that is to say the “Maturity 1” or “youthful” carcasses.

The “Canada B” grade became a sort of “default grade” and was intended for youthful or Maturity 1 carcasses that failed to meet the quality standards for the “A” series but had the same fat thickness standards as the A series. The deficiencies that relegated carcasses to the B grade were related to coarse muscle texture and/or lack if firmness and/or the lack of a bright red colour and/or less than the required level of marbling, which, for the A grade series was a “slight” amount. The reason that I refer to the B grade as a sort of default grade is that in 1991, the last year before the grades were again changed, only 3% of the Maturity 1 carcasses were graded Canada B.

A “C” grade series was also continued to capture carcasses that had been graded in the earlier Canada Commercial grades. As noted above the number of carcasses in the C grade category had been in continuous decline and there was some discussion about discontinuing this grade category entirely. As noted above only 3.7% of the carcasses graded in 1971 fell into the C grades. These were carcasses of intermediate age, (Maturity 2) considered too mature for the A Grade Series but more youthful than the culled cow and bull grades. However these grades became increasingly irrelevant as the already low number of carcasses continued to decline. In 1991 fewer than 1% of all graded carcasses fell into the C 1 and C2 grades. Not surprisingly a grade category for carcasses from intermediate aged cattle was not retained in the grade change of 1992.

The reason for the steady decline in “C” Grade carcasses was that the industry itself was changing with the growing prominence of the feedlot sector. The average age at slaughter was steadily declining and thus fewer carcasses were downgraded because of lack of youthfulness. This meant that most of the carcasses considered too mature for the A series of grades fell into the Cow grades. This reality however

was not to be formalized until the most recent major grade change occurred in 1992 when the C Grade was discontinued.

A Canada D grade was established as Maturity Division 3 and was subdivided into D1. D2, D3 and D4. These divisions had to do with quality characteristics, primarily fat cover, fat colour, lean meat texture and lean meat colour. Basically the D series ranged from carcasses with excellent muscling and good fat cover to poor muscling and poor fat cover.

The new grading system of 1972 required, for the first time ever, that one side of each Maturity 1 (Canada A and B carcasses) was to be "ribbed" which meant that a cut was to be made between the 11th and 12th rib from the spine to several centimetres beyond the ventral end of the Longissimus Dorsi muscle to expose it for grader evaluation with regard to approximate area, lean meat colour, texture and marbling and to measure the fat thickness covering the muscle[3]. This was itself a controversial and contested move. It was feared that too much drying would occur at the cut surface and that carcasses could not be transported safely over long distances if "ribbed" in this manner. This change, of course, preceded by several years the generalized move to increased fabrication at the packing plant level which became known as "boxed beef" and there was a steady and large weekly shipment of suspended carcasses from western packing plants to Montreal. Nonetheless, after some trials were conducted, it was determined that ribbed carcasses could be shipped safely. It may even be argued that the ribbing of carcasses hastened the trend to boxed beef.

In any case the introduction of carcass ribbing created the first opportunity for the grader to assess characteristics like muscle texture, firmness, colour and marbling and the new grading standards contained criteria for that assessment, including the requirement that carcasses of the A grade series had to exhibit at least a "slight" degree of marbling.

The "Canada A" grade series was divided into four sub-divisions namely "A1", "A2", "A3" and "A4" and carcasses that met the A grade quality standards were slotted into the proper category based solely on a measure of fat thickness.[4] The fat

[3] The ribbing site was changed to between the 12th and 13th rib pursuant to regulatory amendment on Sept 29th, 1983 in order to standardize with US practice.

[4] The fat thickness was taken at a the point in the 4th quadrant along the longitudinal axis of the LD muscle where the fat cover was the least.

thickness standards varied slightly according to carcass weight and were specified in fractions of an inch. I cite here the fat thickness ranges for the middle weight range, which was for carcasses weighing between 500 and 699 lbs. This weight range captured the vast majority of carcasses. In this weight range an A1 carcass carried a minimum of 0.2 in. of fat cover and a maximum of 0.4 in. (5.1-10.2 mm). The range for an A2 carcass was 0.41-0.6 in. (10.4-15.2mm); for A3, 0.61 to 0.8 in. (15.5 to 20.3 mm) and for A4 0.81 or greater (20.6 mm). I converted the inches to mm. because the present system uses millimetres. [5]

When the grade standards were changed in 1972 there was no overt attempt to imply or signify that A1 was the superior grade. Efforts were made to assert again that the new standards were "descriptive not prescriptive". It was held that the market place, not the grade standards should determine the preferred grade or the preferred grade for any particular market niche. However, with this change the industry was moving from a situation where the preferred carcass was obviously "Canada Choice" to a system where the "Canada A1" was, by definition, the leanest carcass. Given the earlier preference for Canada Choice carcasses the Canada A1 was not expected to emerge as the preferred grade.

This new grading system was officially launched on Sept. 5, 1972. A ceremony marking the occasion was held at a packing plant in Medicine Hat, Alberta.[6]

It was no surprise that the grading results in 1972 showed only about 32% of the A grade carcasses were graded "A1", 40% were graded "A2", 18% were graded A3 and about 6% were graded A4.[7] After all the new grading system was being applied to a population of cattle that had been bred, raised and fed under a grading system that showed a distinct preference for fatter cattle.

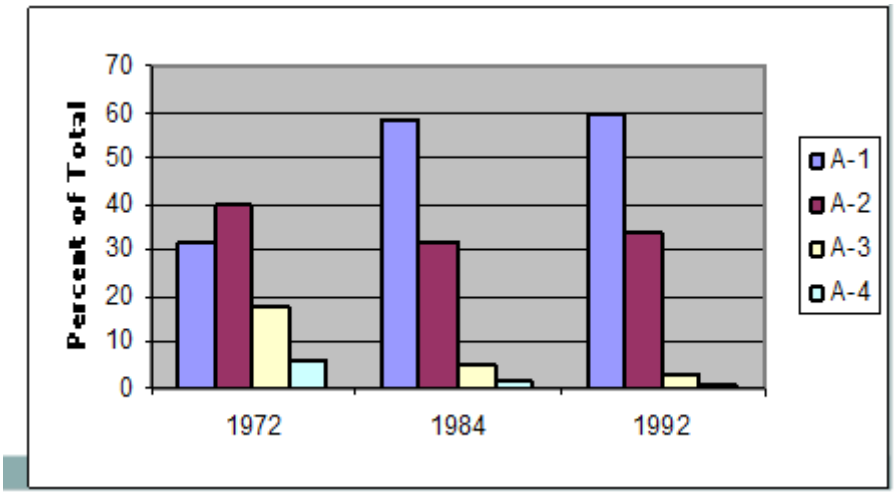
But the change in the market place to a very obvious preference for leaner carcasses was quite abrupt and remarkable. Quickly the A1 and A2 carcasses became preferred, with a distinct preference for the leanest A1 carcasses. The A3

[5] The conversion from Imperial to metric left some gaps due to the increased precision of finer metric gradations.
[6] The event was held at a packing plant in Medicine Hat because that was the riding of the Hon. Bud Olson, then the Federal Minister of Agriculture (Liberal). The occasion was mere weeks before the federal election of Oct 30th 1972. Mr Bert Hargrave had just resigned as President of the Canadian Cattlemen's Association to run against Mr Olson for the PC party and he and Mr Olson together "graded" and stamped the first carcass. Mr Hargrove won the election three weeks later. Coincidentally Sept 5th, 1972 was also the date of the Munich Massacre at the summer Olympics.

[7] This doesn't quite total 100% because of the small number of B grade carcasses.

and A4 carcasses almost disappeared. Indeed their numbers fell to the point that such carcasses were regarded as marketing mistakes. One assumes that this decided preference for leaner carcasses was driven by the retail trade that recognized quite quickly that such carcasses had a higher saleable meat cut-out than fatter carcasses.

Grade Distribution 1972 to 1992



This new grading system was not universally popular. Many felt that quality was being sacrificed to leanness and that beef demand would suffer as a result. Others felt, as already stated, that the grading system favoured, if it did not actually cater to, exotic breeds and crosses. That concern became increasingly moot as exotic blood became ever more pervasive in the industry.

As to the concern about beef demand it should be noted that, at the time the new grading standards were introduced in 1972 per capita consumption was already in a long term rising trend, from 70 lbs. in 1960 to 94 pounds in 1972. Consumption dipped 1.5 lbs. in 1973 but then continued to increase in 1974. Consumption then increased dramatically in 1975 and 1976, but this can be attributed to a massive beef surplus caused by the sharp break in the beef supply cycle in 1974 and the ensuing sharp contraction in the breeding herd. After peaking in 1976 per capita consumption declined steadily year over year until the next change in the grading system in 1993. Following the grading change in 1993 per capita consumption stabilized at about 70 lbs before commencing a continued downward trend in about 2000 toward the low 60 lbs per capita in 2010. I do not think that much can

be said in a definitive way about the impact of the grading system on per capita consumption.

In the early 1990's the discontent that had been so apparent with the previous grading system began to reappear as discontent with the existing system. There was concern that quality had been sacrificed to leanness. Also, though never explicitly stated, marbling, even at the low level of "slight" was being de-emphasized further.

The 1992 and Current Grading Standards

The new Grading standards introduced in 1992 provided for a dual grading system where Quality and Yield were determined independently. For Maturity 1 (youthful) carcasses three quality Grades were created namely;

- "Canada AAA" (triple A);
- "Canada AA" (double A) and
- "Canada A".

All three quality grades have *identical* requirements as related to muscling, lean meat firmness and colour. The only difference in the standard for these three grades is the level of marbling where the "Canada A" carcass requires, *"At least traces but less than a slight amount".* The "Canada AA" carcass requirement is for a marbling level *"at least a slight amount, but less than a small amount".* The "Canada AAA" requires *"a small amount of marbling or more".*

These references to degree of marbling require further explanation. Terms like "slight" and "small" are indeed indistinct.

The USDA had previously established a set of marbling standards ranging from "Devoid" to "Abundant" and had supported these standards with official pictorial depictions (Marbling Charts). The Minimum level requires for a USDA Prime Carcass is "Slightly Abundant" but the Grade can be divided into three divisions of "Prime +", "Prime" and "Prime -" for which the minimum marbling requirements are "Abundant", "Moderately Abundant" and "Slightly Abundant".

Canada did not have a “Canada Prime” Grade until one was created in 1997 at which time the minimum marbling requirement was set at “Slightly Abundant”, as is the minimum standard set by the USDA.

Similarly the minimum standards for Canada A, AA, and AAA, as stated above, are the same as the USDA standards for “USDA Standard” (Traces): USDA Select (Slight) and USDA Choice (Small).[8]

There was often concern expressed that, although the Canadian grading system used the same marbling terminology as did the USDA, producers selling cattle into both markets, were convinced that the marbling standards as applied in Canada were higher than those applied by USDA graders. This may or may not have been true. Certainly there was some trend to selling more heavily finished cattle to the USA and that might have created the impression that USDA graders were applying the standards less rigorously. Nonetheless a decision was made, shortly after the Canadian Grading system was privatized in 1996, to formally adopt and use the USDA Marbling cards; and with that the dispute about application of the marbling standards ended.

Inasmuch as the standards for any carcass in the Prime, AAA, AA and A series are identical in every respect except for marbling level it is clear that marbling is the ONLY variable determinant of quality within the whole range of fed cattle offering. The only exception to this is the low incidence of Youthful or Maturity 1 carcasses that are assigned a Canada B grade.

As with the previous grading standards a B grade series was continued to accommodate youthful carcasses that did not meet the requirements for the A grade and Prime series. The “B1” Grade is for “Maturity 1” carcasses that have less than 2 mm of fat cover at the specified point on the ribbing site. This minimum was lowered to 2 mm from 4 mm. in November 2001. In 2013 only 0.10% of carcasses were graded B1. The “B2” Grade is applied to carcasses that exhibit too strong a hue of yellow in the fat covering the carcass. With virtually all youthful cattle now fed in feedlot this is a largely non-existent problem where the incidence of this grade in 2013 was 0.04% of all Maturity 1 carcasses. The “B3” Grade is reserved for carcasses with muscling deficient to the point of emaciation and in 2013 their

[8] In 1997 following the Privatization of the Canadian Grading system the USDA marbling charts were officially adopted as Canadian standards.

incidence was 0.44%. This The “B4” grade is for “dark cutters” where the lean meat colour is considered unacceptably dark and the incidence of this in 2010 was 1.5% and, as such, constitutes the only real problem within the B grade series.

The “Canada B” grade is thus a sort of “demerit” category for the very small number of youthful carcasses that fail to meet the minimum requirements for the Prime and A grade series. This being the case it can be further stated that, with very rare exceptions the only critical characteristic for the quality grading of youthful carcasses is level of marbling. In 2013 only 1.6% of the Maturity 1 carcasses graded Prime and just 2% graded “A” and 2% graded somewhere in the B grade series. Thus, in about 95% of the cases the grader is simply making a decision between grading the carcass AAA or AA.

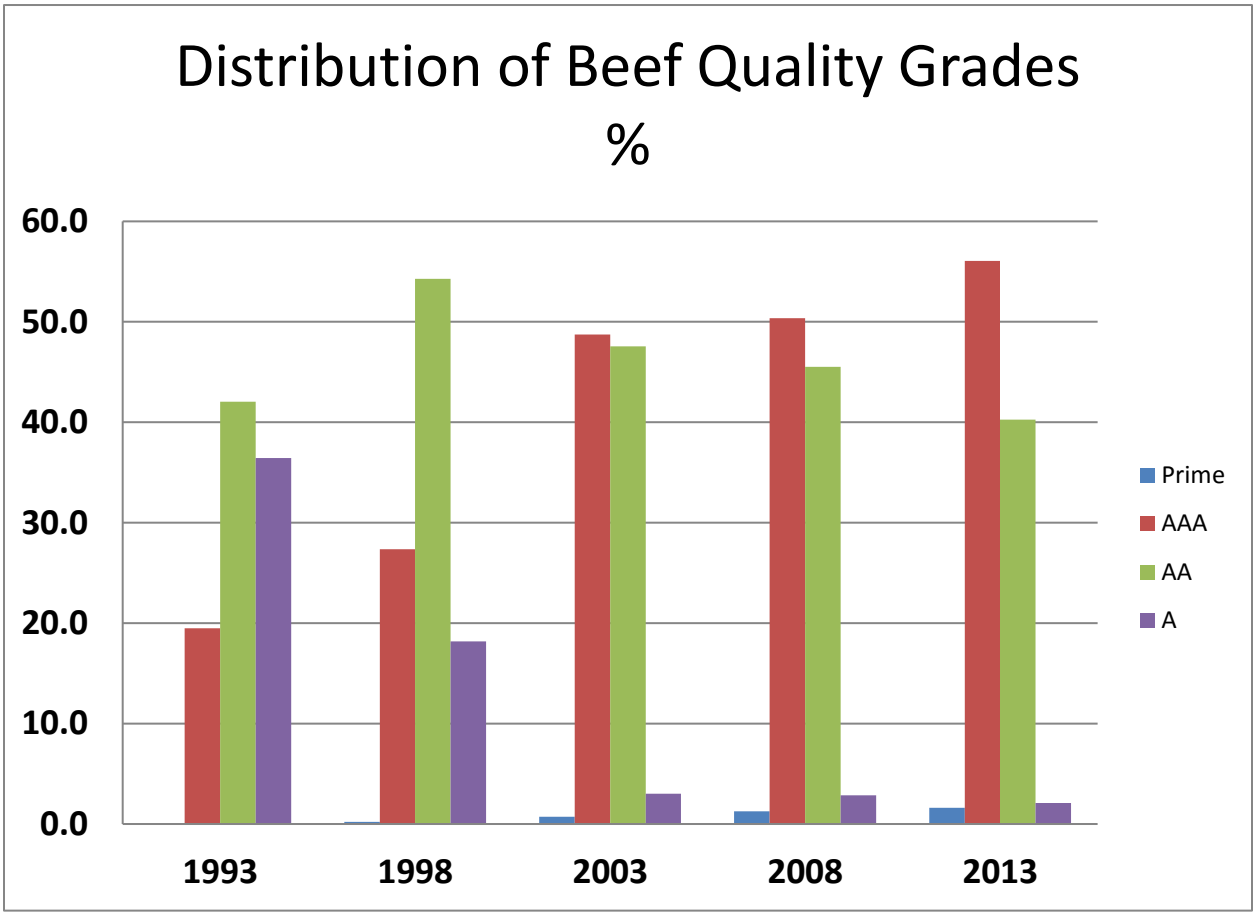
This total dependence on marbling, as the only quality criterion for Maturity 1 carcasses that are not graded Canada B, invites further comment. There is a great deal of literature that suggests that marbling may indeed have some influence upon flavour but has little, if any, influence on tenderness. From a consumer perspective, quality is highly associated with tenderness. Consumer surveys and more rigorous taste panels, have shown a high degree of variability in tenderness in beef found at retail. This is a serious concern for the beef industry as consumers wishing to buy a premium meat product want to do so with assurance of “quality”. The present grading system does not assess tenderness and this remains a major deficiency.

The grading change in 1992 also abandoned the “C” grade. This was a very logical move inasmuch as modern cattle feeding practices have virtually eliminated carcasses of intermediate maturity. Approximately 97% of fed cattle now reach market on or before reaching 24 months of age and virtually 100% reach market on or before 30 months of age[9]. Thus there are only two Maturity classes and any carcass that fails to qualify for maturity 1 defaults to a cow or bull grade of “D” for cow carcasses or “E” for bull carcasses.

Earlier in this paper I showed the trend toward an increase in the proportion of Canada “A 1” carcasses in the grading system that was in place between 1972 and

[9] The age distribution of carcasses was one of the benefits derived from age verification made possible as a result of the National Identification program

1991. The display below shows the changes in the distribution of the Quality grades between 1993 and the present.



In 1993 the industry was adopting a distinctly different quality grading system than the previous system, where the leanest carcasses, the A1's dominated, to a system that placed direct emphasis on marbling. In consequence one sees that in 1993 the new AAA carcasses were the least numerous, exceeded by both AA and A carcasses. By 1998 the AA carcasses continued to dominate and increased to almost 55% of total while the proportion of AAA carcasses had also increased and the A carcasses had declined. By 2003 a very small proportion of carcasses were graded Canada Prime, the grade having been introduced in 1997. In 2003 and the proportion of AAA and AA was approximately equal and together made up about 95% of the total with AAA surpassing AA in 2008. At present (2013) the AAA carcasses now make up 56% of the total and the AA carcasses have declined to 40%. Since 2003 the A carcasses have fallen below 5% of total. We shall see in the next section that an increase in the proportion of AAA carcasses has been achieved at the expense of declining yield percentage.

Yield Classes in the Current Standards

A major and timely change that was introduced in the new grading system in 1993 was an assessment of yield. "Yield" is too often confused with "Dressing Percent", which is the ratio of the carcass weight to the live weight. "Yield" as used in the grading system refers to the ratio between carcass weight and some representation of its lean meat content. In the previous grading system yield was implicit in the A1, A2, A3 and A4 classification because fat content in a carcass is inversely and inextricably related to lean content. This is so because, aside from bone and cartilage content, which is relatively constant, the only other components of a carcass are fat and lean and a higher percentage of one necessarily means a lower percentage of the other. Since "Yield" and "Dressing Percentage" are so often confused I suggest that we should perhaps adopt and promote the term "Cutability" now used widely in the USA as a better descriptor of carcass yield.

In the new grading system an attempt was made to quantify the lean meat content of a carcass by measuring fat thickness and by assessing the area of the cut surface of the Longissimus Dorsi muscle. This estimate was for lean meat content only, (no fat or bone) and the approximate average "lean meat yield" was 59% with a range from a high of 65% to a low of 49%.

This was a well intentioned but badly flawed effort. The formula upon which lean meat estimates are currently based is;

Lean Meat Yield = 57.34 +(0.212 x REA in sq cm.)-(0.81 x Grade fat in mm.) -(0.032 x HCW in kg.)[10]

The first and obvious problem with this formula is that it defines yield as the lean meat content of a carcass. This is, without doubt, the most scientifically accurate approach but it is not consonant with more practical industry requirements. Another approach might have been to refer to yield as the "saleable content of a carcass" which would include some fat and bone content more consistent with commercial practice.

[10] The formula was worked out by meat researchers mainly at the Lacombe research Station and is the result of painstaking lean meat separation on several carcasses and subsequent regression analysis.

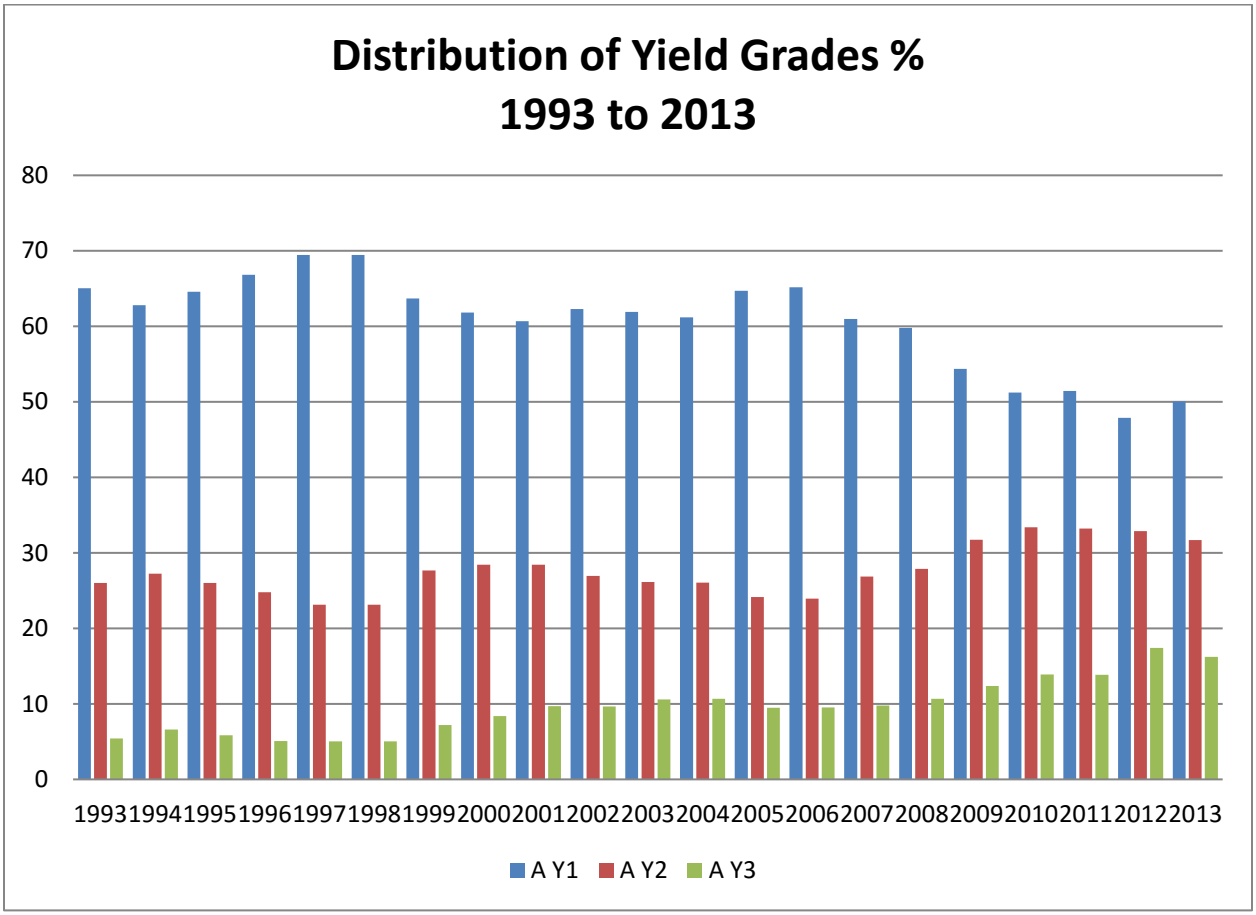
The present grading system provides for three yield classes. Yield Class 1 is for carcasses with a yield, determined by the grader's rule, of 59% or greater. A Yield 2 carcass has a yield of 54 to 58% and a Yield 3 carcass has a yield of 53% or lower. This highlights another deficiency with the system where the yield relates to only the five major Primal Cuts. This creates the unfortunate impression that carcasses yields range form the low 60% level to below 53 % when in fact the yield of saleable product averages 73%.

In commercial practice, the industry in Canada has established that the average ratio between carcass weight and saleable beef content is that the latter is 73% of the former. When the industry switched from describing per capita disappearance (consumption) on a “carcass weight basis” to a “retail basis” the factor of 73% of the carcass weight was used. Thus, I propose that the base yield or average yield of saleable meat from a fed beef carcass should be set at 73%. (This figure should be subject to change with changing industry practice.). The important point to note here is that instrumentation used to “assist” grading can be calibrated to any industry standard.

However, the grader does not actually use the formula above to assess yield. In practice, the grader uses a “grader’s rule” which only approximates the results that would be obtained if actual measurements were made and the formula was applied. The result is that yield estimates made by graders in the present grading system cannot be relied upon as accurate. This is no fault of the grader but of a deeply flawed attempt to reduce a lean meat yield formula to a “grader’s rule”.

Having made such a blatant claim that the present method of determining yield class or yield percentage, “cannot be relied upon as accurate” I feel that I must justify such a statement. I do so by appending my analysis as Appendix 1.

The display below now illustrates the distribution of the yield classes annually since 1993. Note that Yield Class 1 dominates and until 2008 over 60% of the carcasses graded were graded Y1. The Y2 class has been relatively constant with a rising trend in recent years. The Y3 Class has always been the least frequent but displays a generally rising trend.



This is poor centering because there obviously has to be a great deal of yield variation within the Y1 category. Since this was the top yield grade the standards should have been set higher so that the top category would have held no more than 25% of the carcasses, or even 20%, so that the higher yielding carcasses might have attracted a higher premium.

Why Yield is Important

As already mentioned yield refers to the percent of the carcass weight that can be harvested or fabricated into saleable retail beef. The accepted average yield is 73% but there is a great deal of variation above and below this average figure. But percent yield has been the neglected component of the grading system. There are at least two reasons for this. The first is that the understandable preoccupation of the consumer, the retailer and the restaurateur is with quality. Yield is of far less importance to them because they are not directly affected by yield variations. Certainly, there is an impact but it is not as visible as are variations in quality and I will show later that there is indeed an impact. The second reason Yield has been

neglected is that producers have been generally unaware of variations in yield and do not fully appreciate its importance. The industry is used to, and seemingly happy with working on averages.

There have been industry leaders however who have paid attention. One such was a former President of the Canadian Cattlemen's Association, the late George Morris who was in his younger years a butcher and who was well aware of variations in carcass yield. Another producer who has taken an intense interest in this matter is Ross Proctor a Shorthorn Breeder from Wingham, Ontario. His concern and interest led him to feed out two steers named "Roany" and "Spotty" which he entered in the steer show at the 1978 RAWF. The pair of steers were placed in about the middle of a large class with Spotty one place above Roany. Ross Proctor bought back the steers at the ensuing sale and delivered the carcasses to Dr Ron Usborne at the University of Guelph. Both carcasses had been graded A1 but Roany had less fat cover at the ribbing site (0.47 in vs. 0.60in) and a larger rib Eye area (13.3 vs. 10.5 sq in.).Roany had slightly more marbling. Usborne and his team first fabricated the carcass into its retail cuts and also measured the amount of excess fat trim, bone and shrink in each carcass. The results are shown in the table below.

Side Composition %

	Roany	Spotty	Difference % Pts	Diff Actual %
Roasts & Steaks	57.4	51.8	5.6	9.8
Lean Trim	15	13.1	1.9	12.7
Total Retail	72.4	64.9	7.5	10.4
Fat	13.9	20.5	-6.6	-47.5
Bone	13.5	14.5	-1	-7.4
Trim	0.2	0.1	negligible	

The quoted rail price used in this exercise was $1.20/lb carcass basis. For comparative purposes, the carcasses were off similar weight but I am using the side carcass weight of Roany which was 650 lbs.

The next table shows the pricing.

Product Value ($/lb)

	Roany	Spotty	Difference
Carcass Value	$1.20	$1.20	
Retail Cost	$1.66	$1.85	-$0.19
Adj. Carcass Value	$1.20	$1.08	$0.12

The average price paid on a carcass basis was $1.20 per lb. Because Roany had a higher yield of 72.4% the cost of each retail pound was $1.66. Spotty had a lower yield of 64.9% so the cost of each pound of retail yield was $1.85. it is plain to see that Roany was undervalued and spotty was overvalued.

But what if we weren't working on averages? From this example, it is apparent that the average value of a pound of retail yield was the average of $1.66 and $1.85 or $1.7550. Why not pay for each of these carcasses not on their carcass weight but on their retail yield. The results of paying for what is actually there are shown in the next table where Roany would have fetched $127.06 per cwt and Spotty would have returned $113.90 as is now shown.

Revised Values

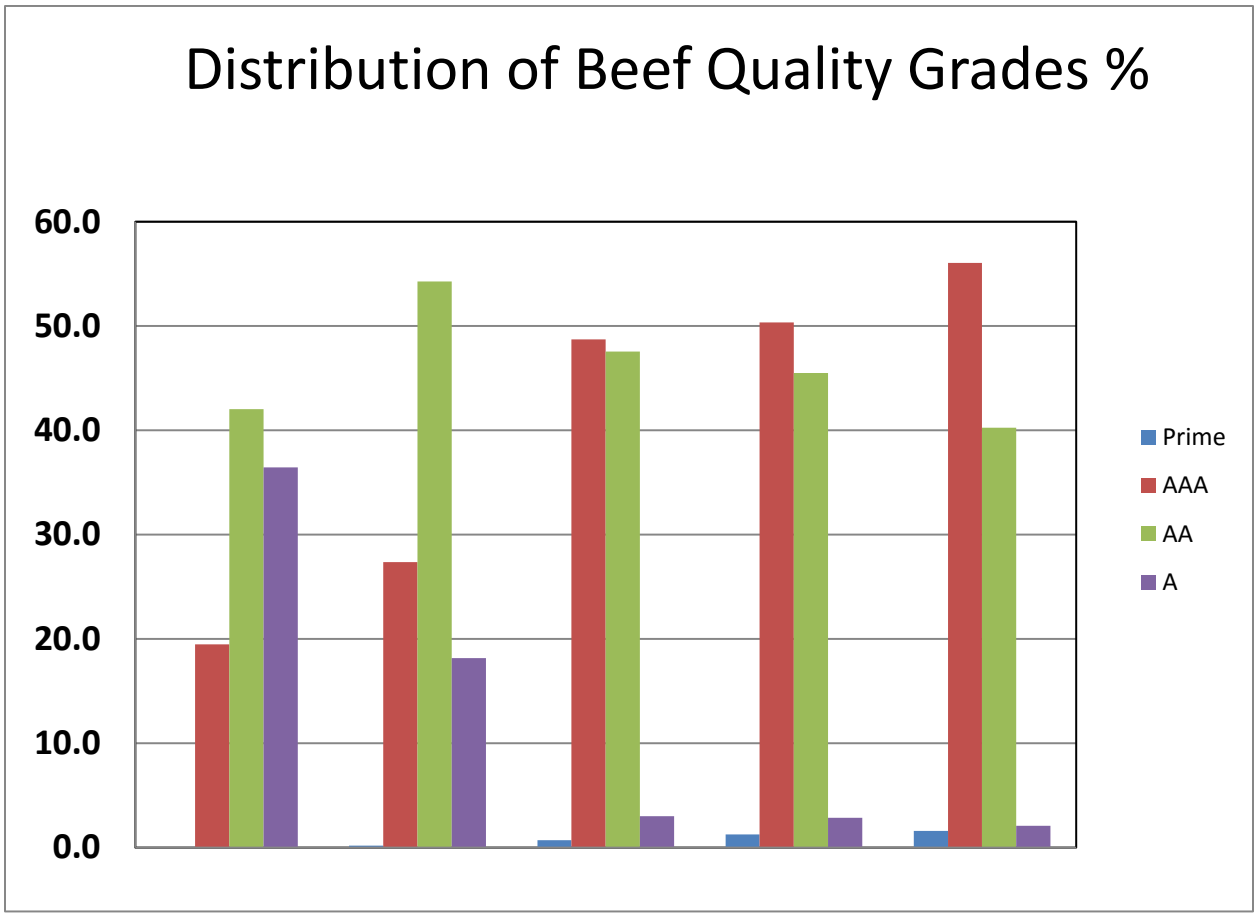
	Yield	Av. Value per lb.	Value
Roany	72.4	1.755	127.06
Spotty	64.9	1.755	113.90
Total			240.96

Note that the same total dollars were spent. That is to say 2 cwt @$1.20 = $240.00. (The difference of $0.96 is due to rounding of retail costs in the second table.)

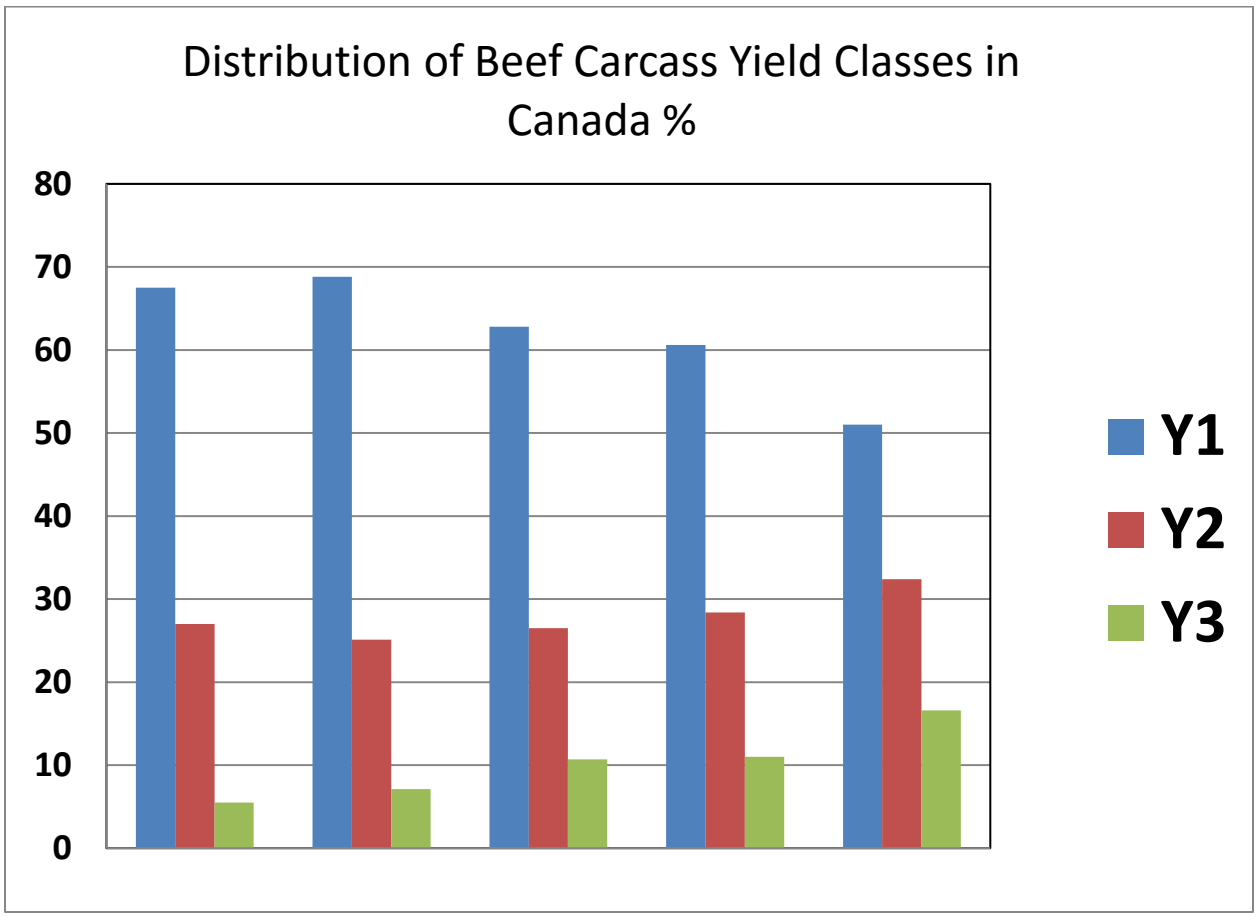
Although this example involves only two steers the calculations indicate that Packers aren't expected to pay more or less for their supplied of cattle but to pay for what they actually get in yield from individual carcasses based on their yield of saleable product.

The Relationship between "Quality" and "Yield"

I now show again the history of Quality and Yield Grading results by displaying the results together. The first display shows the trend in the Quality categories featuring the steady increase in the AAA grade, the relative stability of the AA grade and the virtual disappearance of the A grade.



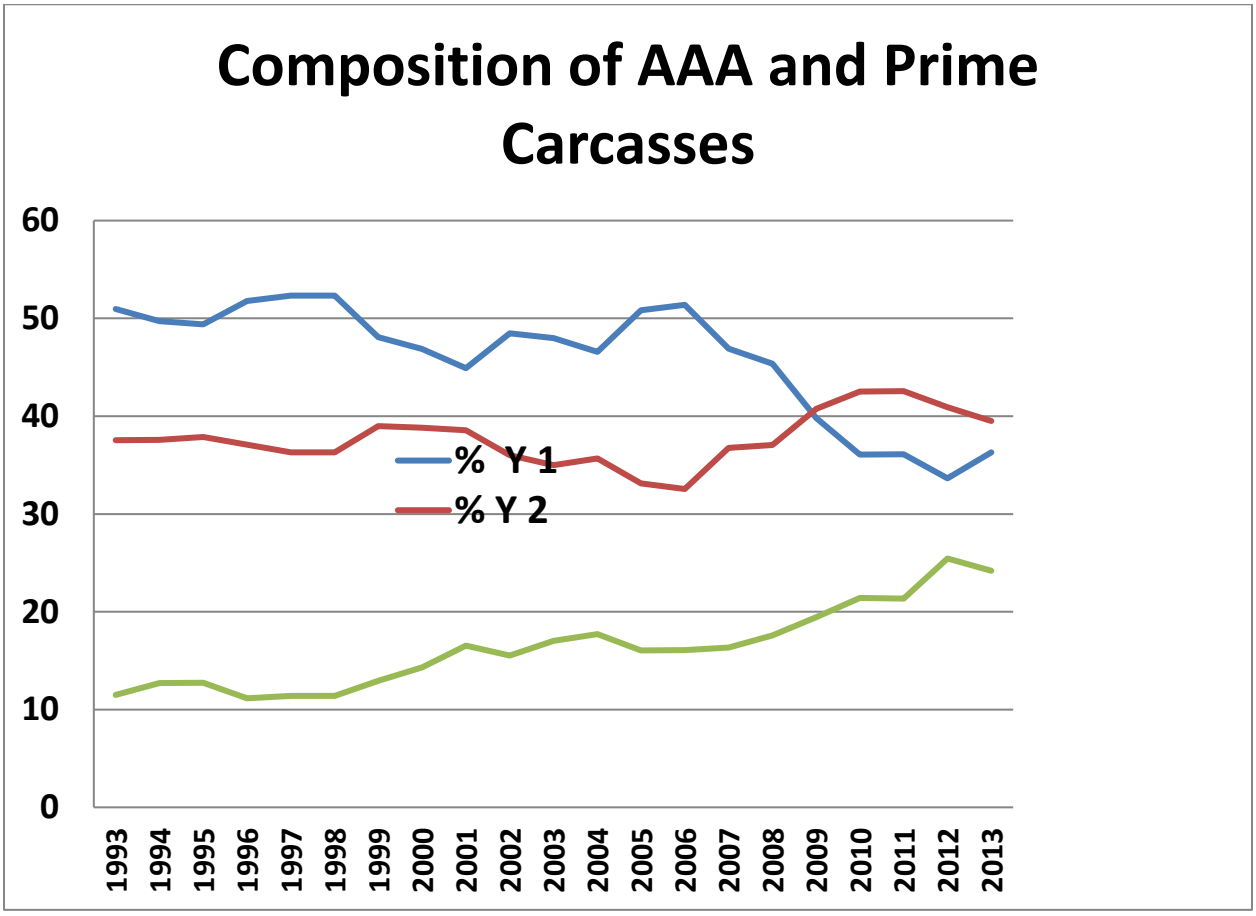
By contrast one notes in the next display the steady decline in the Y1 yield category and the unmistakable increase in the Y3 category. I acknowledge that I have earlier commented on the unreliability of the Yield grade estimates so some may wonder at the reliability of the depiction below. The point to be made here is that the trend line when based on more than a million carcasses can be considered reliable while the yield grade on each individual carcass remains highly unreliable.



It is impossible not to see the consistency with which the proportion of Y1 carcasses declines as the proportion of AAA carcasses increases. There appears to be a conundrum here because, as has been clearly demonstrated, the primary determinant of "quality" within the Maturity 1 category is degree of marbling. Marbling refers to the interspersion of fat as seen and evaluated on the cut surface of the LD muscle and, as such, should not have a measurable impact on yield. So why is yield declining while marbling increases? The inescapable answer is that, in order to achieve and ensure the desired level of marbling the easiest thing to do is to feed cattle longer which leads to increased external fat. Also note that a major component of the yield formula is fat thickness where an increase of 1 mm in fat thickness reduced yield percent by 0.81 percentage points.

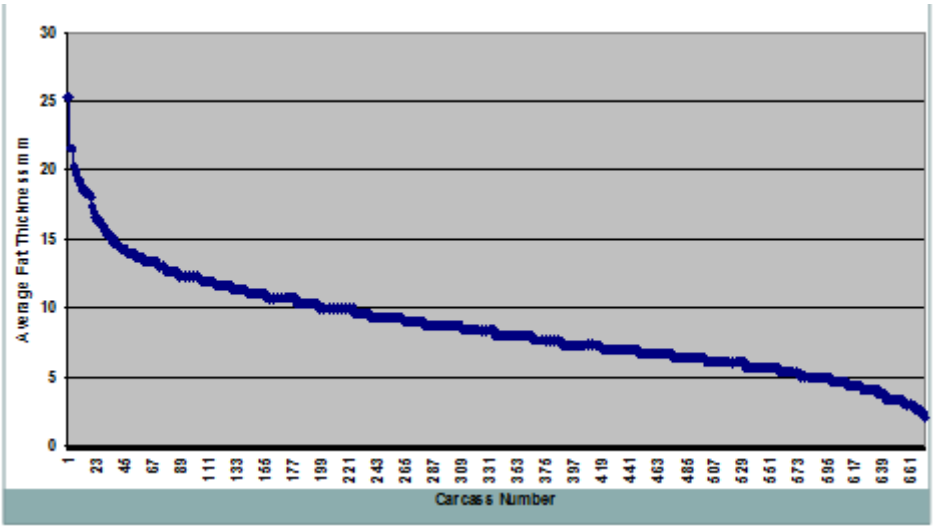
Further undeniable evidence that Yield is being sacrificed to "Quality" is found when one looks at the proportion of Y1 carcasses found in the AAA and Prime grades and how this has changed since 1993. From 1993 to 1997 approximately 50% of the AAA and Prime carcasses were Y1 carcasses. The proportion remained at or above 45% until 2006. From 2006 onward the proportion of Y1 carcasses in the AAA and Prime category has declined rapidly to a 2012 low of only 34%.

Meanwhile the proportion of lower yielding Y2 and Y3 carcasses in the AAA and Prime grades has increased, especially the lowest yielding Y3 proportion. In 2012 25% of the AAA and Prime carcasses were of Yield Class 3. This means that the AAA and Prime carcasses today are fatter and lower in lean meat content that they have been since the early 1970's.



This trade off between Quality and Yield might be acceptable if it was conceded as necessary to feed cattle to a degree of over-finish in order to ensure the desired level of marbling. But this need not be the case, and indeed was not the case in the early years of the present grading system, as is clearly shown in the display above. There is also ample evidence that it is possible to combine high yield and the desired high level of marbling in the same carcass. I demonstrated this during my work with a packing plant in Saskatchewan where we actually measured yield, instead of using the Grader's Rule and found that about half of the AAA and Prime carcasses had 8 or less mm of fat cover at the grade fat site, (see chart below) and were therefore both high quality and high yield.

Fat Thickness Distribution – Canada AAA



But there are impediments to achieving this goal, one biological in nature and the other economic. The biological impediment has already been mentioned and that is that the easiest way to ensure marbling is to feed the cattle to increased levels of fatness, but at the cost of declining lean meat yield. This is happening in Canada presently because of the second impediment that occurs where the trade pays a distinct premium for AAA and Prime carcasses but only a token premium for Y1 carcasses. Thus, the cattle feeder has a stronger incentive to market AAA and higher grading cattle than to market cattle that will fall into the highest yield category. The obvious reason for this imbalance between a desire for a AAA or better quality grade and high yield the premium for AAA and better is higher than the token premium for Y1 carcasses. The reason the Y1 premium is lower, I would contend, is that the industry is clearly not convinced that the Yield classification system is accurate enough to justify a larger premium.

In fact, no “premium” should ever be paid for high yield. As I will point out later yield is a measurable attribute and should be paid for directly. Premiums are only appropriate for subjective attributes like quality.

This situation need not continue to exist. It is possible, both through genetic selection and feeding and management, to produce a high proportion of cattle that will display marbling at the desired level and will also be high yielding. But this will not and cannot happen until the market place recognizes and pays equal attention

to, and compensation for, both superior Quality and superior Yield. To accomplish this five things need to happen.

Necessary Changes and Innovations

1. Yield estimates must be accurate

First, and most importantly, we need to have much more confidence that a stated yield classification or percent is reliably accurate. The packer who cannot be confident in the accuracy of yield estimates will not be willing to pay for it. A small step toward increased accuracy is the adoption, but long delayed, implementation of the five yield categories used by the USDA. However, this is a very small step when computer assisted grading can deliver yield as an actual percent instead of as a category. Why would the industry settle for five yield categories when computer assisted grading can provide an actual percent yield figure on every carcass?

2. Instrument Grading

That then is the second requirement, the full deployment of instrument grading. This is often referred to as “instrument assisted grading but in fact instrument grading is possible and the only “assistance” needed is proper calibration and supervision. Instrument grading has been possible and “imminent” since 1996 but has not yet been deployed.

3. Grading Information Must Be Shared

The third requirement is that Grading data needs to be gathered in an industry repository and made available, not only to the last owner and seller but back to the cow calf producer. With national ID and traceability this is now possible and indeed was virtually promised as a benefit of the National ID program. The creation of BIXS (the Beef Information Exchange) now makes this possible.

It is important to point out here that when the National Cattle Identification program was launched its primary purpose was to help ensure food safety, and to manage disease outbreaks by creating individual animal identification and traceability. Producers were explicitly assured that one of the additional benefits to them would be the capability to flow grade and yield information back to them on an individual carcass basis. This was represented to producers as being just as crucial as, for example, individual lactation records on dairy cows.

4. Grading Data Belongs to the Industry

An extremely critical fourth requirement is to recognize that grading data is not "owned" by anyone to their exclusive benefit but belongs to the industry. Recall that at the very outset of beef carcass grading M.J Maybee stated that:

"The grading or marking of beef according to quality provides a standard basis for buying and selling in all transactions from the producer to the consumer and permits each quality to find its proper level according to general acceptability."

That serves to remind us that the intent was that the grading system was designed to benefit all sectors of the industry. Grading does occur within packing plants but that necessity does not, and ought not, confer ownership of the data upon the packing plant operator. Indeed. the most recent cattle identification program is paid for, in large part, by the producer who is obliged to purchase the tags. Without that it would be impossible to trace a grade to an individual animal. Packers must be made to see that they are merely temporary custodians of the grades. A proper move now would be to download all individual animal grade information to a central agency, logically the Canadian Beef Grading Agency, so that the industry could use this information in constructive ways beneficial to the industry. Arguably there may be a small cost associated with the weekly or daily downloading of this individual animal grade information to a central depository but that could easily be worked out between the packer and that depository. But the packers cannot sell the grade data because it is not theirs to sell.

5. Pricing must encompass both Quality and Yield

The fifth critical requirement is a pricing system that recognizes and compensates for yield. At present the base price for cattle sold on the rail is usually a price bid for AA cattle with premiums for AAA and Prime carcasses and a discount for A grade carcasses. Since Quality is somewhat, if not totally subjective a premium or discount is appropriate and these premiums and discounts are determined in the market place. But Yield is not a subjective carcass attribute. It is a measurable quantity and thus can be compensated for with an actual adjustment in the price, just as the price of milk is based on a standardized butterfat level with adjustments for higher or lower average butterfat.

This last requirement is so important, yet so simple, that I wish to describe its simplicity. This explanation assumes, as already suggested, that the accepted industry average carcass yield is 73%;

Step 1

On a day to day basis a price is established, in whatever manner, between buyer and seller. That price, for demonstration purposes, is agreed to be $2.00/lb on the rail, basis "AA". The premium for "AAA" and for "Prime" and the discount for "A" are also negotiated and agreed to be +$6.00, +$8.00 and -$5.00 respectively. Discounts for carcass weights that were over or under the desired range would also have been agreed upon. All these combine to establish a "base price" exactly as occurs presently. Ignoring the carcass weight, discounts the price for a Prime, AAA, AA and A carcass would be $2.08, $2.05, $2.00 and $1.95 respectively.

Step 2

The price on each carcass would now be adjusted for its yield and the yield adjustment would be the actual % yield of the individual carcass divided by 73. If for example;

- The prime carcass had a yield of 70% the price for that carcass would be (70/73) x 2.08= $1.99.
- The AAA carcass had a yield of 72% the price for that carcass would be (72/73) x 2.05 = $2.02.
- The AA carcass had a yield of 74% the price that carcass would be (74/73) x 2.00 = $2.03.
- The A carcass had a yield of 76% the price that carcass would be (76/73) x $1.95 = $2.03.

In this illustration I have shown the generally inverse relationship between Quality and Yield. But it is possible to produce AAA carcasses that have high yield so that;

- An "AAA" carcass yielding 75% would return (75/73) x 2.05 = $2.11

Some may balk at this situation where, seemingly, low yield in a AAA carcass seems to cancel out the AAA premium. But this is not the case. The packer is still paying $2.05 per pound for a AAA carcass but in the first bullet above he is getting fewer pounds of saleable beef because of below average yield. But in the last bullet where high quality and high yield are combined the packer benefits from getting more pounds of saleable beef together with the quality he seeks.

Instrument Grading

Computer assisted grading has long been promised. As early as 1996, the year the beef grading system was privatized, the industry was assured that computer and camera assisted grading was imminent. A great deal of time and effort, not to mention money, was spent in an ultimately unsuccessful attempt to deploy the "computer vision system" CVS as an assist to grading.

More recently a new, and presumably improved, camera and computer assisted system known as the "E+V System" has already been approved as a grading assistance device and such approval has been in hand since August of 2011. But the system has not yet been deployed for grading because we await long delayed amendments to the grading regulations to make such procedures official. This is a ridiculous situation when delays in regulatory amendments can delay needed advancements in the industry. On at least three occasions I, and others, have suggested that since producers and packers are in agreement a Memorandum of Understanding should permit the use of the technology at once and in advance of the regulatory change. Further delay is unconscionable.

Privatization of the Beef Grading System in 1996

This discussion of beef carcass grading issues would not be complete without a brief discussion of the decision that was made to privatize the grading system. In the mid 1980's there was increasing discussion of cost recovery on the part of various Federal Departments including Agriculture Canada. An obvious target was the livestock grading systems. Though many in the industry were aghast at the idea that the service would no longer be free, the CCA recognized the reality and simply took the position that if the cost became onerous they would favour privatization. Important as beef grading is to the industry and to consumers it is hardly a vital service. Unlike Meat Inspection, there are no human health implications attached

to beef grading. Thus, the CCA was prepared to enter into discussions about cost recovery. Cost recovery at $0.20 per beef carcass was introduced by regulatory amendment in August of 1985 and had increased to $0.30 by 1989 and then to $0.50 by 1995. At the time of the 1995 increase the industry was offered a scheduled increase to $0.58 in 1996, $0.66 in 1997 and $0.74 in 1998. Other species (bison, hogs and lambs) were also included though at different per head rates. Early in the process Agriculture Canada, Livestock Division had indicated that it was open to discussions about privatizing the delivery portion of the grading system while retaining regulatory authority. There is little doubt in my mind that the Livestock Division was anxious to divest itself of the grading delivery program but certainly the escalating fee helped convince the industry that privatization should be considered. The industry had made it clear from the beginning of cost recovery that if the costs became too high they would seek privatization of the grading system. Thus, when Agriculture Canada began increasing the fee as indicated above and indicated that the fee would inevitably rise further the CCA announced that it would seek to privatize the entire system. This idea was not resisted by Agriculture Canada. Grading is not related in any way to food safety and Agriculture Canada appeared more than willing to divest itself of the service while, of course, retaining regulatory oversight.

I was retained in July of 1995 by the CCA to undertake this privatization effort and was instructed that the project should be completed within a year. I was also advised that Computer Assisted Grading was imminent and that I should bear that in mind in the privatization effort. I was assisted greatly by personnel within Agriculture Canada, particularly Mr. Richard Robinson and by an Advisory and Provisional Board drawn from the ranks of producers and packers. We faced many challenges but none delayed the completion of the privatization effort by April of 1996.

An early and crucial decision was that the cost of grading could no longer be uniform across the industry but would be plant specific, because costs are lower in larger plants than in smaller plants. In 1996, 85-90% of the cattle were slaughtered and graded in the 5 or 6 largest plants with the remainder being graded in smaller plants where the cost per head would be much higher. In a number of cases suitable arrangements were worked out but several smaller plants simply discontinued the

service. In the case of one very small plant in a remote location we permitted the option of plant grading, subject to occasional and random supervisory visits.

It is important to point out here that, having pondered the issue of privatization upon being tasked with the project, my first proposal to the Board was that the time had come to institute a system whereby trained plant employees would become the graders and the newly formed Canadian Beef Grading Agency would become an oversight and auditing authority. I envisioned in my first proposal three of four well qualified Grade Standards Auditors who would visit plants on a random and unannounced basis to check the work of the graders and who would have authority to withdraw a grader's credentials. My arguments were that carcass grading, though important, was not a particularly difficult exercise and that the powers vested in the Agency, and the Agency employed auditors, would be just as effective as contracted Agency graders. I also pointed out that grading data could also be audited by statistical techniques where questionable trends would precipitate special attention from an auditor.

This proposal was considered too large a step. Though comments were polite it was then obvious that producers were leery of letting a plant employee grade carcasses and there was obviously some scepticism as well between plants.

In any case, I mention this now because I think the time has come to reconsider that earlier proposal. Grading agricultural products by the plant operator or processor under proper regulatory control is not a new concept. More on that later.

The results or effects of the privatized grading service became instantly apparent. The agency retained some of the more experienced graders and allowed the more experienced of them to retain or engage other graders in a subcontract arrangement. In effect and in fact these graders became, not employees of, but were and are under contract to the CBGA. The first and immediate effect was that the number of graders required was reduced by at least 50% as graders, who were now paid on a per carcass graded basis in most cases stayed at their posts for longer periods of time and did not take the overly generous work breaks accorded to them when they were federal employees.

In the larger plants, the per carcass grading fee was initially set at $0.57 per carcass with rates as high as $1.10 per head in smaller plants. With experience, the rate for

the larger plants fell to a low of $.34 per head in the largest plants by 2002 and rose a $1.93 per carcass in the smallest plant. The current lowest rate (2014) is $0.54 while the highest rate is just under $15.00.

The reduced number of graders however created an anticipated problem. What was to be done in a plant that had only one or two graders and a situation developed, as it predictably would when, due to illness, family circumstances or weather, the grader did not appear when the grading process was scheduled? A carryover from my suggestion that a trained plant employee should be authorized to grade was agreed upon and in each plant that wished to do so, one or more employees were trained and qualified as a grader to grade during the unanticipated or forced absence of the regular grader contracted to the CBGA. The only requirement placed upon the plant was the obligation to notify the CBGA by telephone or other direct communication, such as an e mail, that an approved and qualified plant employee was on the grade stand. This alerted the CBGA to take note of the grading results reported by the plant grader. No problems of any kind have been encountered with this arrangement.

Plant Grading

I mentioned earlier the possibility that qualified plant employees should now be authorized as graders and that the role of the CBGA in this respect should be as an auditing body.

With the advent of instrument grading the grader's role would in most cases evolve into simply being the "supervisor" if not the operator of the camera and computer based equipment. Certainly with respect to the yield component of the grading system the approved equipment would be seen to be vastly superior to the grader's rule and the only function the grader would play would be to ensure that the equipment remained in proper calibration.

With respect to Quality grading the data in this article confirms the following.

- That Maturity is no longer a concern with regard to the grading of fed steers and heifers inasmuch as all fed steers and heifers are marketed before they reach 30 months of age. Further, the once significant "intermediate maturity group (the previous C grades) has been discontinued.

- The very small proportion of carcasses that are now graded B1 to B4 would be handled as follows;
    - The B1 would be identified by the grading equipment as having
        - < 2mm of fat cover.
    - The B2 is extremely rare but could possibly be detected by the equipment. This is the only B grade that might be problematic, depending on whether it is possible to calibrate the equipment to detect fat colour.
    - The B3 grade is a grade for deficient muscling and as such could be detected by the grading equipment.
    - The B4 or dark cutter could easily be calibrated into the grading equipment.

  Of equal importance the incidence of the rarely occurring B grades could and should be monitored by statistical means and any untoward increase in incidence would prompt a physical audit.

  Aside from the matter of the B grades the sole remaining determinant of the four quality grades is level of marbling. This may sound surprising but a careful reading of the regulations confirms this statement. Indeed the quality standards for the Prime, AAA, AA and A grades are all under the same heading and the only variation between the quality grades is marbling standards. Thus the grading equipment will determine the quality grade and the responsibility of the equipment operator, be that operator a “grader” or a qualified plant employee will be to ensure that the equipment is properly calibrated and operating correctly at all times.

- There is another important form of monitoring that can be used in addition to plant visits. Grading data should be monitored closely on a day to day and plant to plant basis using normal statistical procedures.
- The advent of instrument and camera assisted grading creates the possibility that grading images can be stored and subject to direct review in a remote location either in real time or subsequently. In this way the

CBGA could actually audit the grading process in any plant at any time. And the grading data, both with respect to Quality and Yield could be retained for any given period of time.

- Another measure could be instituted to require the packing plant to retain the grading images for two weeks. This would allow ample time for the seller to launch a request for a review if there were serious concerns about the grading results. This would be an actual improvement on the present system where the evidence disappears as soon as the carcass is processed.

Conclusion

We see in this review that, from the beginning, informed cattlemen, packers and government personnel were resolved to create a beef carcass grading system to facilitate quality improvement and commerce. They recognized the need for a centralizing common standard, or common language, to facilitate industry advancement and product improvement. As times and circumstances changed they altered the grading system to serve current needs.

- In the late 1960's and early 1970's they created a system of standardized procedures in packing plants in anticipation of growing interest in grade and yield selling.

- In the early 1970's they created a new grading system to effectively address a serious problem with overfinish. In 1992 they created a dual grading system that, for the first time explicitly addressed carcass yield.

- When it became appropriate to do the industry privatized the grading system.

- The industry developed technology that would permit instrument grading thereby making grading results more consistent and accurate.

- Finally, in pursuit of improved product safety they collaborated to introduce an individual animal identification and traceability system that ties together all that went before. For the first time ever it is possible to link the carcass grade to the individual animal but to date we have failed to integrate all of

these important individual pieces into an integrated whole. That is the challenge and opportunity that lies before us now.

It has been apparent for some time now that assessing quality solely on the basis of marbling is, at best, a very imperfect indicator. Marbling is not a reliable indicator of tenderness which is important to consumers and the trade. Furthermore, I have already commented at some length about the imperfections and inaccuracies inherent in the present method of assessing yield. This is becoming inexcusable. Known variations in yield are just as important as variations in quality. Yield variations follow an approximate normal distribution and at present prices the value differences between a carcass that is 1 percentage point below average and a carcass that is 1 percentage point above average yield is almost $8.00 per cwt. The cattle industry lags seriously behind all the other livestock species in recognizing and adopting technology that will increase the efficiency of production. This undeniable situation is worsened by the fact that cattle are already the least efficient of the meat producing species. Can we afford to continue to disregard known technologies that will narrow the gap?

Now we are on the threshold of further advances that involve instrument based grading and the ability to use individual carcass grade information to advance the industry by making grade information accessible to the industry and particularly to the breeder who produces the calf. This has been made possible by individual animal identification. It is our chance to exercise the same vision as those nearly a century ago saw and acted upon the need to create the first grading system

Appendix 1: Deficiencies in Present Yield Grade System

NOTE- the following section offers a brief explanation of the several serious flaws in the present Yield categories. In one sense, the issue is becoming moot as we move toward the adoption of Camera and Computer assisted grading. But, in another important sense, yield is such an important trait in a beef carcass, and has been so poorly dealt with in the present grading system, that many do not appreciate the value of an accurate indication of yield. My concern is that yield is being disregarded because commercial experience with the present yield estimates has shown that yield estimates within the present grading system are unreliable.

With regard to REA (Area of the Longissimus Dorsi Muscle) the graders rule is used to "categorize" the length and width of the LD muscle, not as to actual length and width, but as one of three categories 1, 2 or 3.The combination of length and width then creates a "muscle score" of 1 to 4. In the little table below, taken directly from the Grader's rule, the way the muscle score is derived is shown. The Muscle score appears in **bold** in the body of the table and one can see immediately how three length and three width groupings are compressed into only 4 muscle scores. This is a source of major error and overlap.

Length	1	2	3
Width			
1	**1**	**1**	**2**
2	**1**	**2**	**3**
3	**2**	**3**	**4**

When this categorization is translated into actual length and width measurement and the resulting Area is calculated one can determine the full range of REA in each category.

I results are as follows: The REA range for Muscle Score 1 is from 75.2 to 98 sq. cm.

The REA range for Muscle Score 2 is from 90.2 to 109.2 sq. cm.

The REA range for Muscle Score 3 is from 96.0 to 116.2 sq. cm.

The REA range for Muscle score 4 is from 106.5 to 124.0 sq.cm.

The degree of overlap in REA in the Muscle Score categories is significant. Between Muscle score I and 2 the overlap is 22.8%; between MS 2 and 3 the overlap is 50.8%; between MS3 and 4 it is 34.6%. This degree of overlap is the result of compressing 9 divisions of length and width into four muscle scores and renders the muscle score as a completely unreliable indicator of Yield.

In order to make these calculations I had to apply arbitrary limits to affix a lower and upper limit on both width and length. I did so by adding 1.5mm to the maximum length for category 2 and 0.7 cm to the maximum width for category 2.

If we now turn these ranges to estimate the contribution to yield we can do so by multiplying each number in the range the by the contribution factor (x0.212) in the yield formula as follows

Muscle Score 1 Contribution varies from 15.9 to 20.8 percentage points.

Muscle score 2 Contribution varies from 19.5 to 23.2 percentage points.

Muscle score 3 Contribution varies from 20.4 to 24.6 percentage points ,and

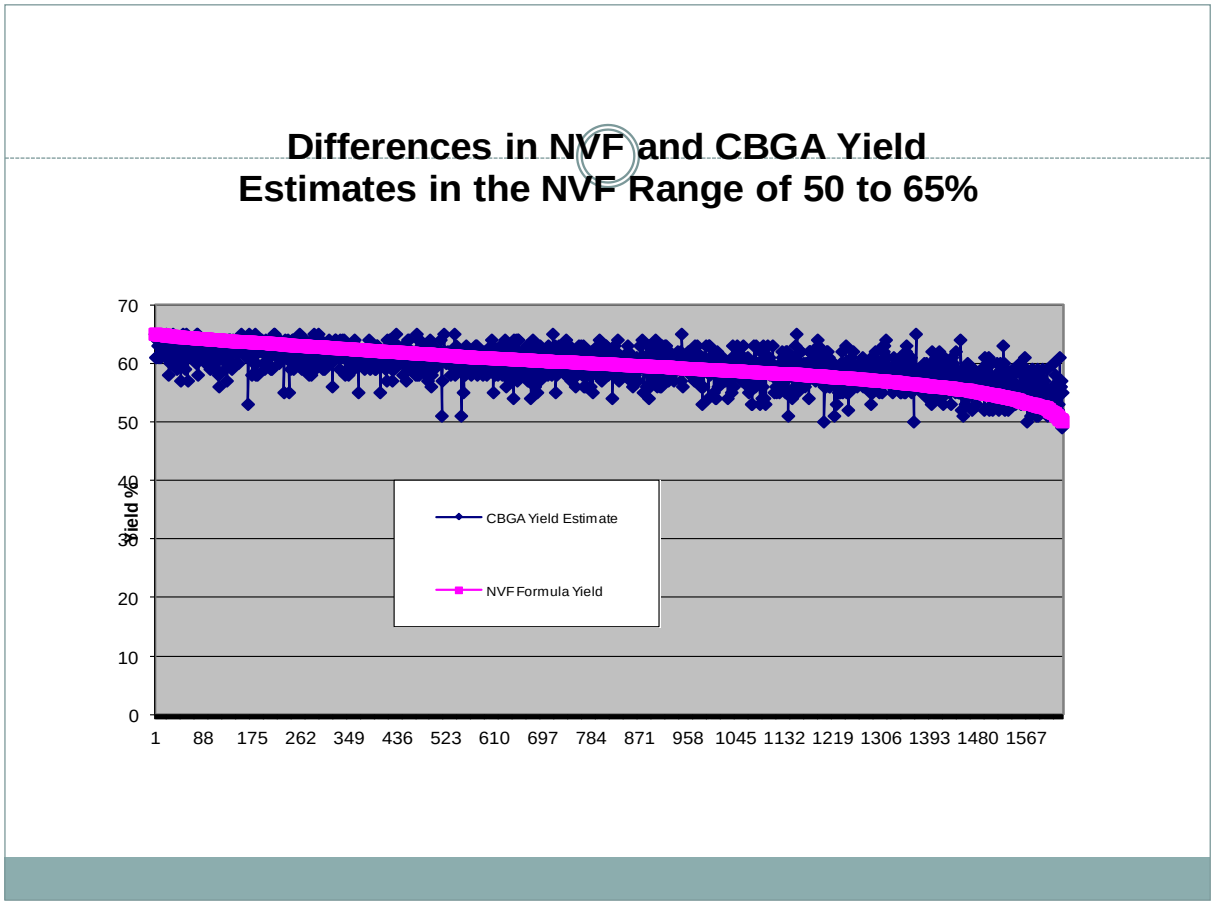
Muscle score 4 contribution varies from 22.6 to 26.3 percentage points.

Little more need be said to demonstrate conclusively that the yield estimates that flow from use of the grader's rule are virtually useless. Add to that the fact that minimum and maximum yields are "open ended" and the further fact that a carcass weight variation of 100 lbs (45.35 kg) changes the yield percentage by 1.45 percentage points, yet is ignored in the grader's rule, and one can see that yield estimates on individual carcasses are hopelessly unreliable. Clearly a carcass graded Y1 could actually be a Y2 and a carcass graded Y2 could be either a Y1 or a Y3 and a carcass graded Y3 could as easily be a Y2.

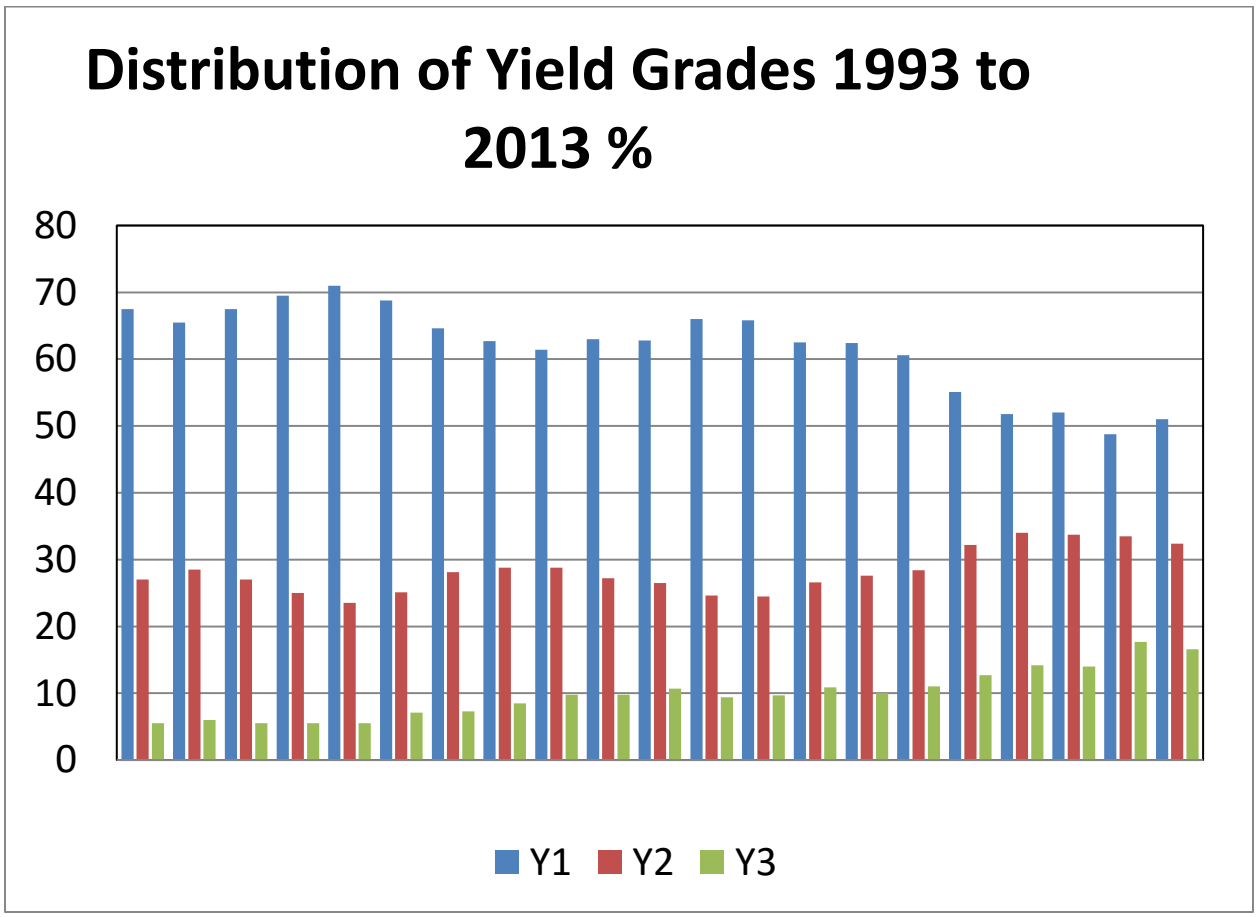
This could largely explain why Yield is not seriously considered within the industry. The packer experience must be that the yield estimates provided by the grading service are not consistent with actual experience.

Finally it needs to be acknowledge that this inaccuracy is not the fault of the grader but is clearly caused by a poorly conceived "graders rule" that does not require direct measurements.

As a sidebar to this discussion I recount that in the period 2004 to 2006 I was involved with a packing plant in Saskatchewan and we decided to actually measure the length and width of the LD muscle and to measure the fat thickness to the nearest millimetre, and also to take account of carcass weight in accordance with the formula. When we compared our yields to those provided by the grader the result was not at all surprising. In the depiction below is plotted the individual carcass yields on 1,600 carcasses. The smooth line is the plotting of the yield of individual carcasses ranked from highest to lowest yields as determined by our procedure of actually measuring and using the formula. Scattered above and below our line is the yield of each individual carcass as determined by the grader. Note that at the high end of yield the graders yield rarely goes as high as our estimates and at the low end rarely goes as low. That is because the extreme maximum and minimum yields according to the grader's rule are 65% and 49% respectively, whereas our yields were the results of actual formula calculations without arbitrary limits imposed.



A further serious problem with the three class Yield system was that the designers even failed to centre the system on the population of carcasses. Quite arbitrarily the designers decided that a Y1 carcass would be a carcass with a yield of 59% or greater, a Y2 carcass would have a yield of 54 to 58% inclusive and a Y 3 carcass would have a yield of 53% or lower. If one compares the distribution of carcasses with the yield categories as shown in the depiction below one sees that, in the early years of the new system over 60% of the carcasses were Y1 carcasses. 20 to 25% were Y2 carcasses and only about 5% were Y3 carcasses.



Appendix 2 Current Grade Standards, (Relevant Extracts)

I have included here only those components of the act that relate to the definition of a bovine carcass and the actual grading standards.

"beef carcass"

> "beef carcass" means the carcass of a slaughtered bovine animal that is produced for beef and has had the following removed, namely,
>
> (*a*) the hide,
>
> (*b*) that portion of the head and neck forward of the first cervical vertebra,
>
> (*c*) that portion of the foreshank below the carpal (knee) joint and that portion of the hindshank below the tarsal (hock) joint,
>
> (*d*) the respiratory, digestive, reproductive and urinary systems and the thoracic and abdominal organs,
>
> (*e*) the membranous portion of the diaphragm and the pillar of the diaphragm,

(*f*) the spinal cord,

(*g*) the kidney fat, pelvic fat, heart fat and scrotal or udder fat,

(*h*) the tail posterior to the first coccygeal vertebra, and

- (*i*) any portion of the carcass the removal of which is required for pathological reasons under the *Meat Inspection Regulations, 1990*; (*carcasse de boeuf*)

PART III GRADE NAMES AND GRADE STANDARDS FOR BEEF CARCASSES

GENERAL

29. There shall be 13 grades of beef carcasses with the grade names Canada A, Canada AA, Canada AAA, Canada Prime, Canada B1, Canada B2, Canada B3, Canada B4, Canada D1, Canada D2, Canada D3, Canada D4 and Canada E.

SOR/97-368, s. 6.

30. (1) Subject to subsection (2), a grader shall determine the fat level of a beef carcass by measuring the fat on the left side between the twelfth and thirteenth ribs at the minimum point of thickness in the fourth quarter from the vertebrae along the longitudinal axis of the *Longissimus* muscles and perpendicularly to the outside surface of the fat.

(2) Where it is impossible to take an accurate fat measurement of a beef carcass, the grader shall determine the fat level through an assessment of the external fat on the beef carcass or by an examination of the fat on the right side of the beef carcass after it has been knife-ribbed.

(3) A grader shall determine the yield and yield class of every beef carcass that is graded Canada A, Canada AA, Canada AAA or Canada Prime.

(4) A grader shall determine the yield of a beef carcass that is graded Canada A, Canada AA, Canada AAA or Canada Prime by using the prediction equation approved by the Minister.

(5) The yield class of a beef carcass that is graded Canada A, Canada AA, Canada AAA or Canada Prime and that has a yield set out in column I of an item of the table to this section is the yield class set out in column II of that item.

TABLE

DETERMINATION OF YIELD CLASS FOR CARCASSES GRADED CANADA A, CANADA AA, CANADA AAA AND CANADA PRIME

	Column I	Column II
Item	Determined Yield (%)	Yield Class
1.	59 or more	Canada 1
2.	54 to 58	Canada 2
3.	53 or less	Canada 3

GRADE STANDARDS FOR CANADA A, CANADA AA, CANADA AAA AND CANADA PRIME

31. The standards for a beef carcass of the grade Canada A, Canada AA, Canada AAA or Canada Prime are the following:

(*a*) the maturity characteristics set out in Schedule I to this Part;

(*b*) muscling that ranges from good, with some deficiencies, to excellent;

(*c*) *Longissimus* muscles that, 10 minutes after being exposed by knife-ribbing, are firm and bright red in colour;

(*d*) for the grade set out in column I of an item of the table to this section, the marbling level set out in column II of that item; and

(*e*) a fat covering that is

- (i) firm and white or slightly tinged with a reddish or amber colour, and
- (ii) not less than 2 mm in thickness at the measurement site.

TABLE

MARBLING LEVELS FOR CANADA A, CANADA AA, CANADA AAA AND CANADA PRIME

	Column I	Column II
Item	Grade	Marbling Level
1.	Canada A	At the least, traces, but less than a slight amount
2.	Canada AA	At the least, a slight amount, but less than a small amount
3.	Canada AAA	At the least, a small amount
4.	Canada Prime	At the least, slightly abundant

GRADE STANDARDS FOR CANADA B1

32. The standards for a beef carcass of the grade Canada B1 are the following:

(*a*) the maturity characteristics set out in Schedule I to this Part;

(*b*) muscling that ranges from good, with some deficiencies, to excellent;

(*c*) *Longissimus* muscles that, 10 minutes after being exposed by knife-ribbing, are firm and bright red in colour; and

(*d*) a fat covering that is firm and white or slightly tinged with a reddish or amber colour.

SOR/2001-342, s. 6.

GRADE STANDARDS FOR CANADA B2

33. The standards for a beef carcass of the grade Canada B2 are the following:

(*a*) the maturity characteristics set out in Schedule I to this Part;

(*b*) muscling that ranges from deficient to excellent;

(*c*) *Longissimus* muscles that, 10 minutes after being exposed by knife-ribbing, are bright red in colour; and

(*d*) a fat covering that is yellow.

GRADE STANDARDS FOR CANADA B3

34. The standards for a beef carcass of the grade Canada B3 are the following:

(*a*) the maturity characteristics set out in Schedule I to this Part;

(*b*) muscling that ranges from deficient to good;

(*c*) *Longissimus* muscles that, 10 minutes after being exposed by knife-ribbing, are bright red in colour; and

(*d*) a fat covering that is white or slightly tinged with a reddish or amber colour.

GRADE STANDARDS FOR CANADA B4

35. The standards for a beef carcass of the grade Canada B4 are the following:

(*a*) the maturity characteristics set out in Schedule I to this Part;

(*b*) muscling that ranges from deficient to excellent;

(*c*) *Longissimus* muscles that, 10 minutes after being exposed by knife-ribbing, are dark red in colour; and

(*d*) a fat covering that has a colour ranging from white to yellow.

GRADE STANDARDS FOR CANADA D1

36. The standards for a beef carcass of the grade Canada D1 are the following:

(*a*) the maturity characteristics set out in Schedule II to this Part;

(*b*) muscling that is excellent; and

(*c*) a fat covering that

- (i) extends well over the ribs and loins and moderately well over the hips and chucks,
- (ii) is firm and white or slightly tinged with a reddish or amber colour, and
- (iii) is less than 15 mm in thickness at the measurement site.

GRADE STANDARDS FOR CANADA D2

37. The standards for a beef carcass of the grade Canada D2 are the following:

(*a*) the maturity characteristics set out in Schedule II to this Part;

(*b*) muscling that ranges from medium, with some deficiencies, to excellent; and

(*c*) a fat covering that

- (i) extends moderately well over the ribs and loins and lightly over the hips and chucks,
- (ii) ranges from firm to slightly soft,
- (iii) has a colour ranging from white to yellow, and
- (iv) is less than 15 mm in thickness at the measurement site.

GRADE STANDARDS FOR CANADA D3

38. The standards for a beef carcass of the grade Canada D3 are the following:

(*a*) the maturity characteristics set out in Schedule II to this Part;

(*b*) muscling that is deficient to a degree of emaciation; and

(*c*) a fat covering that is less than 15 mm in thickness at the measurement site.

GRADE STANDARDS FOR CANADA D4

39. The standards for a beef carcass of the grade Canada D4 are the following:

(*a*) the maturity characteristics set out in Schedule II to this Part;

(*b*) muscling that ranges from deficient to excellent; and

(*c*) a fat covering that is 15 mm or more in thickness at the measurement site.

GRADE STANDARDS FOR CANADA E

40. The standards for a beef carcass of the grade Canada E are the following:

(*a*) the beef carcass is the carcass of a bull or stag; and

(*b*) the beef carcass has pronounced masculinity.