

Consistency and Quality

Some Lessons from Saskatchewan's Beef Supply Chain

A Report Prepared for the Saskatchewan
Agriculture Development Fund

by Alvin Ulrich and Derek Brewin



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Executive Summary

THIS STUDY PRESENTS AN OVERVIEW of how and why the present situation in the North American beef system is encouraging the development of branded beef and the development of more vertical integration in the beef industry.

It describes the nature of the Saskatchewan beef sector and how it should change to deal with on-going trends in the North American beef industry to avoid increased consumer disappointment with beef by increasing the consistency of the beef-eating experience. For added realism, it includes a selection of interviews that were carried out with people involved in the Saskatchewan beef supply chain.

With the exception of game, no meat profits more by proper aging (than beef). Few households are able to buy, not for the lack of money, but for lack of supply, the kind of beef purchased by hotels and clubs. The scarce superior grades are almost always reserved for these commercial establishments.

The American woman, through visual advertising, has been made to feel that bright red lean beef is the desirable grade, but actually beef for best flavor should be well aged to a purplish tone and show definite evidence of mottling, as well as heavy fat coverings.

—*Joy of Cooking*, (1973) p. 398

■ The three most popular meats in the world are beef, poultry and pork. Of these three, beef is, by far, the most variable and inconsistent because the range of genetic types, the methods of feeding and management, and the methods of cutting up the carcass are far greater for beef than for poultry or pork.

■ In North America, the greatest volume of beef is consumed in the form of ground beef in such products as hamburgers, tacos, chili, lasagna and sausage.

■ In North America, the greatest value of beef is produced from the loin and rib portion of the carcass in the form of steaks. These steaks have marbling (i.e., intra-muscular fat) and are most commonly cooked by grilling.

■ The definition of beef quality varies with the end use. Buyers of steak say that taste and tenderness are the most important ways to judge the quality of a steak, however, these traits are difficult and/or expensive to measure before the steak is actually eaten.

■ Marbling is highly correlated with taste and tenderness so there is a great deal of emphasis on marbling as a measure of the overall value of a beef carcass. Marbling usually improves the quality of a steak but it often detracts from the quality of other cuts of beef where intra-muscular fat is a detrimental factor.

■ Cattle produced in Saskatchewan come mainly from mixed grain and cattle farmers who have 100 or less cattle or from ranchers who have more than 100 head. It is unlikely that the former group will be willing and able to change their management practices to produce large lots of consistent sized cattle, however, this group of producers will likely remain for a long time to come because they have low cash costs and because cattle provide them with a way to turn poorer quality land and surplus winter labor into a source of cash income.

■ This mixture of producers means that Saskatchewan will continue to be a producer of a wide range of cattle for slaughter and hence that there will be a wide range of types and kinds of beef produced.

■ Although there are 21 different grade combinations in the Canadian beef grading system, the

majority (85%) of carcasses from western Canada fell into only five grade combinations in 1997. These were: AA1 (37%), AAA1 (14%), A1 (13%), AA2 (11%) and AAA2 (10%).

■ Buyers for retail chains and the HRI trade often buy only one grade of beef (e.g., AAA) but complain that there is too much variation in the size, tenderness and taste of the beef cuts, even though they are buying a single grade. This is because the existing grading system cannot do a good job of cheaply and consistently identifying carcasses that will give the same beef eating experience.

■ The trend toward industrial scale production of beef oriented meals has greatly increased the demand for consistent beef cuts, even though the overall quality of the beef cuts may go down. It is now quite possible to find cases where large, consistent batches of mid-quality beef will bring a higher total value to a packer than a similar sized batch of meat that contains a mixture of high and low quality cuts. This is because the consistent batch requires only one adjustment of machines and labor to be processed whereas as the inconsistent lot may require many adjustments. Each adjustment has associated with it, physical costs and lost production in the form of “down time.”

■ For more and more North American consumers and restaurant operators, “time is money” and meat products which require long preparation times are becoming less and less attractive.

■ With more and more meals being prepared outside the home, consistency of cuts is becoming one of the most important criteria in deciding which type of meat to process, prepare and promote.

■ In an attempt to capture market share from conventionally sourced steak and from higher priced pork and poultry meals, some companies and cattle associations have instituted a system of branding and/or vertical integration.

■ Such systems try to improve the consistency of the final beef eating experience by limiting the range of genetics, feeding systems, selling weights, slaughter techniques, aging times, cutting methods and cooking procedures.

■ It is too early to say, with certainty, if consumers will ultimately be willing to pay for the extra costs involved when these type of systems are used to produce a more consistent beef eating experience. An improved grading system coupled with clear cooking instructions attached to the retail package may give a more consistent beef eating experience at lower cost to consumers.

■ Saskatchewan will likely continue to produce a wide range of beef cattle and, therefore, relatively inconsistent beef. This is not what the North American market wants.

■ The Saskatchewan beef industry can improve its chances of long term viability by carrying out activities which will lead to more consistent beef products and hence less consumer disappointment with their beef-eating experiences. Such activities should include at least the following:

1. Improve the grading system and signals to producers by:

- Assisting investigations that look at how to quickly and cheaply assess the taste and tenderness of the higher priced cuts of beef at the packer level;
- Examining ways to improve the existing beef grading system, and especially the “A” grades, so that buyers receive a more consistent product when specifying a particular grade combination; and
- Helping potential new and existing processors of processed beef products overcome the relatively high cost of having a federally inspected meat processing plant (i.e., Saskatchewan has a very small population so most beef products must be exported; exports

of beef products are not permitted unless they come from federally inspected plants)

marbling, non-traditional times of calving and marketing, etc..

2. Develop more consistent production and processing practices by:

- Investigating the feasibility of joining or forming a beef program that stresses the production of consistent beef;
- Examining ways for smaller cow/calf producers to jointly produce cattle in larger, more consistent lots (e.g., agreeing to use the same breeds or breeding systems, selling in a narrower weight range); and
- Carrying out research into the technical and economic benefits and costs of alternative cattle production systems that look at the possibility of producing grass fed beef with no

3. Encourage the development of products which improve the consistency of beef by:

- Developing new products that rely on things like marinates, physical cutting, tumbling and restructuring to produce more consumer ready-to-eat products, particularly those that can be made from the mid-priced cuts that are experiencing a market decline, to produce dishes that are ready to heat and eat (e.g., beef cubes made into curry, Tex-Mex dishes, marinated Filipino dishes, etc.)

	
<p>striploin grilling steak</p> <p>club pack™, aged 14 days, cut from Canada "AAA" beef</p> <p>30-036 15.39/kg /lb 6⁹⁸</p>	<p>striploin grilling steak</p> <p>club pack™, aged 14 days, cut from Canada "AAA" beef</p> <p>30-036 15.39/kg /lb 6⁹⁸</p>
	
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Tough steaks! A recent survey found that over 30% of steaks and over 35% of roasts purchased over a six month period in six supermarket chains in Alberta were ranked as unacceptable for tenderness by a trained lab panel.¹ Given such dismal results in the heart of one of North America's major beef producing regions, it is no wonder that per capita beef consumption in North America continues to drop.

I. Background

In the last 50 years, the Saskatchewan cattle industry has experienced both physical and regulatory changes to the environment in which it operates. Recently, the North American beef industry has seen a move to increased vertical integration of production, processing and retailing. The industry is becoming more and more dominated by a few large retailers, large packers and large feedlots. There has also been a trend toward promoting and selling beef under brands like "Certified Black Angus" and "Alberta Beef." Why is this happening?

These changes have led some people to question whether or not Saskatchewan cattle producers have a future if they decide not to follow the trends being observed in other parts of the beef industry in North America. Is there a future for the smaller cow calf producers and cattle feeders found in Saskatchewan? Should the provincial government start a "Saskatchewan beef" program? Should government agencies, breed associations or producer groups start to encourage limits to the range of activities that are permitted by producers when raising beef? Why is beef consumption going down? What things could be done to increase consumption of beef grown in Saskatchewan? What things should we do to keep the beef industry strong in the province?

By talking to stakeholders and reviewing recent findings, this study attempts to provide a broad view of some of the issues surrounding the Canadian grading system, the move toward more branding of beef products, and the move toward more vertical integration in the beef industry. This should help Saskatchewan producers, processors, retailers, consumers and government regulators to better deal with such on-going changes.

This study is a first step in addressing these issues. It does not claim to have all the answers or even all the questions. Instead, this study should be viewed as a message from various stakeholders about how and why the North American beef industry is changing and how all the players in the Saskatchewan beef industry can survive and take advantage of these changes.

II. Study Outline

In the first part of the study we briefly review the nature of beef and beef product demand, the nature of the Prairie beef producer, and the present Canadian grading system. Then we look at some of the trends that the North American meat industry is experiencing. From this we look at the growing demand for improved consistency in products, including beef. This leads us to next look at the possibility of increasing the demand for prairie beef by increasing its consistency. Finally we consider some of the additional questions that should be answered as Saskatchewan beef producers struggle with the world of change in the beef industry. Throughout this report, we have added some realism by including interviews we have had with people that are involved in the Saskatchewan beef supply chain.

III. The Nature of Beef and Beef Product Demand

The Nature of Beef

The beef supply chain starts, throughout the world, with cow/calf producers. In Argentina and Australia, most of these producers raise their herds, including the weaned calves destined for

slaughter, on nothing but forages. In North America most weaned calves are fed to slaughter weight on cereal grains. Different feeding regimes as well as different climates, calving times, ages at time of slaughter and breeds lead to a wide range of animals sold to packing plants for slaughter.

Since there is a wide range of cattle going to slaughter, there is a wide range of beef products that can be produced. The variation in beef comes not only from the wide range in the type of cattle, but also because the beef carcass is so big that it can be cut up in many different ways. For instance, we could make T-bone steaks out of the loin, roast out of the hind leg, brisket out of the upper ribs and so on. We could also cut all or some of the carcass into cubes for such dishes as stew, shish kabobs or fajitas. We could grind some or all of the carcass into “ground beef” and use it in things like hamburgers, meatloaf, meatballs, lasagna, pizza, tacos and so on.

The piece of beef that finally appears on our plate can vary even more than the range that exists with cattle or raw beef because of the multitude of cooking and non-cooking treatments that can be carried out with beef. We could, for instance, turn it into a fermented uncooked dry salami, we could boil it to make soup stock, simmer it to make stew, chop it and eat it raw in the form of steak tartar, grill it over an open flame for a barbecue, pickle it to make corned beef, marinate it to make beef adobo, bake it to give us roast beef and so on. The list could go on and on, and is limited only by a cook’s skill and imagination.

Cattle and hence beef are found throughout the world. They are an excellent way to turn widely available but indigestible plant products (e.g., cellulose) found in the leaves and stems of grasses, into a food that humans can easily digest (i.e., beef and milk). In addition to a food source, cattle can also be extremely useful in providing traction power, fuel, leather and industrial and medicinal products. The global availability of cattle has, no doubt, contributed to the widespread popularity of beef and, hence, to a wide range of cooking and eating habits based on beef.

In many parts of the world, beef is common-

ly eaten in small amounts and is accompanied by large amounts of non-meat foods. It is often cut up into cubes, marinated and/or cooked slowly with spices and herbs. These cutting methods tenderize the meat and make almost every cut of beef from almost any age of animal acceptable in the eyes of the consumer. Beef is often cooked by women not working outside the home and the time it takes to cook a particular piece of beef is not a big consideration. Where such cooking and eating traditions prevail, the price of beef relative to other meats is, in most cases, the single most important factor that influences how much meat is eaten.

Beef Demand

However, the preferences of the world’s beef eaters are changing, particularly in countries that have experienced a high degree of industrialization and high levels of income. This includes North America, the major market for most of the cattle and beef produced in Saskatchewan. In North America, we find that beef eaters have become very discriminating about what cuts of beef they eat and how it is prepared. For many beef consumers, “time is money” and they want beef that is tasty, tender and takes little or no preparation time. Many of today’s beef eaters have had little education in where different beef cuts come from, how they differ in taste or texture and how to best cook these different cuts.

Today in North America, ground beef, in its various forms, but especially in the form of hamburger, is the single most common way that beef is eaten. However, it is also very common to eat beef steaks. In the summer, grilling a steak outdoors is very popular and an easy way to entertain friends. The best steaks are cut from the loin or mid-back of an animal. The muscles in this region are quite thick but do not do as much work as the big leg muscles and hence the muscles in the loin are not as tough as those of the legs and not as thin as those found in the neck or belly region. Loin muscles also tend to accumulate fat on the outside of them (i.e., backfat) and within the muscles themselves (i.e., marbling fat), partly because these muscles are not used very much. The combination of

large but tender muscle tissue combined with intra-muscular fat means that slices of loin muscle (e.g., T-bone steak) can be cooked in a very simple way and still give a very tender and tasty eating experience in a short period of time. Hamburger can also be cooked in very simple ways and it remains very tender but it is not nearly as tasty as a steak.

Over the last fifty or more years, North Americans have become more and more infatuated with grilling steaks and the priced of steak-

“When in doubt, the stock answer to the menu problem is, ‘Let’s have a steak!’”

—*Joy of Cooking, (1973) p. 398*

like cuts of beef has risen considerably relative to other cuts of beef. The highest price steaks can be more than five times the price of an equivalent weight of a low valued beef cut. Another way to consider this would be to look at the weight and value of different

portions of a typical beef carcass. (See Figure 3.1.) About 40% of the carcass can be made into higher priced cuts like steaks and they can account for up to two thirds of the value of a carcass. On the other hand, 40% of a typical carcass will end up being made into ground beef but this will only account for about 30% of the value of the carcass.

In Table 3.1, we calculate the approximate value each cut of meat is contributing to the total carcass value by using quoted prices shown in the Nov-97 issue of the National PROVISIONER. However, we recognize that, at any given time, it may be difficult to translate retail prices into live cattle prices because:

- 1) there are seasonal variations in the relative prices between cuts;
- 2) retailers may use fresh beef as a “loss leader” to lure customers into the store (i.e., the store willingly loses money on beef to attract customers into the store because, once in the store, customers tend to buy much more than just beef);
- 3) some cuts take more labor and overhead to produce than other cuts and hence the margin is not the same for all cuts; and
- 4) a carcass can be cut up into a number of different ways and a high retail price premium for several cuts from a whole carcass may do little to raise the average price of the whole carcass.

Figure 3.1 Theoretical Value of a Carcass of Beef

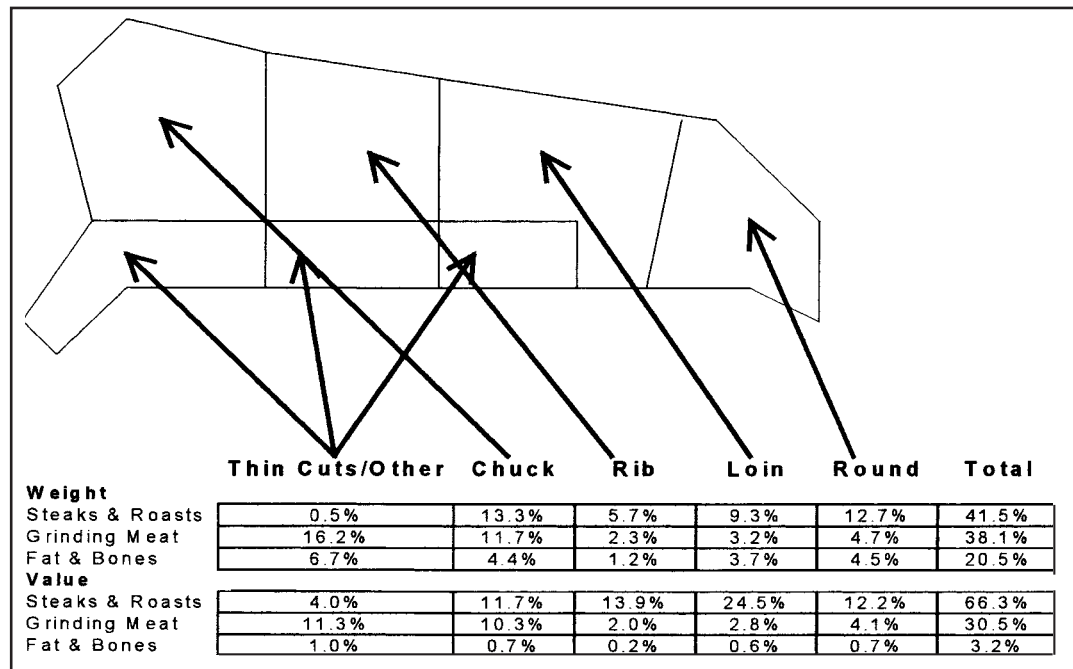


Table 3.1 Theoretical Value of a 714 lb Carcass of Beef - Nov. 7th, 1997

	Retail Cuts lbs.	Ground Beef a/ lbs.	Fat & Bones lbs.	Portion of Total Weight	Wholesale Price US\$/lb /b	Implied Value US\$	Portion of Total Value
Round							
Round	82.6			11.6%	1.13	93.34	11.3%
Rump c/	7.8			1.1%	1.02	7.96	1.0%
Other		33.4	32.0	<u>12.7%</u>		101.29	12.2%
Loin							
Porter House d/	19.6			2.7%	3.32	65.07	7.9%
T-bone	9.8			1.4%	3.32	32.54	3.9%
Strip	15.0			2.1%	2.15	32.25	3.9%
Sirloin	15.3			2.1%	2.82	43.15	5.2%
Tenderloin	6.8			1.0%	4.45	30.26	3.7%
Other		22.7	26.5	<u>9.3%</u>		203.26	24.5%
Rib							
Roast	23.0			3.2%	2.82	64.86	7.8%
Steak	9.2			1.3%	3.37	31.00	3.7%
Short Ribs	8.6			1.2%	2.21	19.01	2.3%
Other		16.5	8.4	<u>5.7%</u>		114.87	13.9%
Chuck							
Blade Roast	33.9			4.7%	1.02	34.58	4.2%
Steaks	35.5			5.0%	1.02	36.21	4.4%
Pot Roast	25.4			3.6%	1.02	25.91	3.1%
Other		83.3	31.4	<u>13.3%</u>		96.70	11.7%
Thin Cuts							
Flank Steak	3.6			0.5%	2.42	8.71	1.1%
Pastrami Squares	2.9			0.4%	1.02	2.96	0.4%
Skirts	4.7			0.7%	1.02	4.79	0.6%
Brisket	16.0			2.2%	1.02	16.32	2.0%
Other		87.3	20.1	<u>3.8%</u>		32.78	4.0%
Other							
Kidney, Hanging Tender c/		4.9					
Breaking Fat e/			27.8				
SUMMARY							
Total Retail Cuts f/	319.7			44.8%	1.72	548.91	66.3%
Total Ground		248.1		34.7%	1.02	253.06	30.6%
Total Fat and Bones			146.2	20.5%	0.18	26.32	3.2%
Total for Carcass		Weight	714.0		Value	828.29	100.0%

a/ This is assuming all trim and stewing beef is turned into grinding beef.
b/ Prices taken from actual Urner Barry Yellow Sheet closes, as reported in The National PROVISIONER, Nov-97.
c/ Assume price for rump is the same as for grinding beef.
d/ Assume price for porter house is the same as for rib steak.
e/ Assume breaking fat is the same value as normal fat.
f/ Retail price is total value of retail cuts divided by total weight of retail cuts.

Generally, consumers have found that steaks, and especially steaks that have been grilled, seem more tender and flavorful if they have some marbling (i.e., intra-muscular fat). Over time, restaurants and home consumers have started paying higher prices for steaks that are well marbled. Such marbling is usually a result of a combination of genetics (i.e., some breeds of cattle produce more marbling than other breeds), feeding and age. Cattle producers in North America make full use of the “feeding approach” to meet the demand for marbling by making sure cattle eat a grain-based diet for two to eight months before being slaughtered. Grain based diets have high-energy (i.e., calorie) levels and many of these calories are turned into fat by the animal. This fat is usually first deposited around the outsides of the muscle groups and then, with further fattening, the fat starts being deposited within the muscles to give us marbled meat and steaks that are more highly valued in the market place.

Unfortunately trying to get a high degree of marbling for a tender, grilling steak has several negative effects on the rest of the carcass. First of all, it leads to more outside muscle fat that consumers want trimmed off. This means that yield of saleable meat from the whole carcass goes down as the fat content goes up. In addition, it means that marbling also starts to take place in areas of the carcass where it detracts from the value of non-grilling steak cuts (e.g., internal fat would not be desired in such beef products as stewing beef, beef jerky, corned beef, pastrami squares, ox tail, ribs, roast and ground beef).

This makes the non-steak portions of a well-marbled carcass harder to sell and accentuates the North American problem of finding profitable ways to move the “mid-priced cuts” (i.e., those that can not be turned into steak-like cuts but are too expensive to use in ground beef). In North America such mid-priced are becoming increasingly difficult to sell because the traditional methods of cooking them involve roasting, simmering and/or stewing. Many older North Americans still buy mid-priced cuts for roasting and simmering but such cooking methods take

time and knowledge of more complex cooking methods - two things that are generally in short supply among younger North Americans.

Since all parts of a beef carcass must eventually be sold, the mid-priced cuts must be priced in North America at increasing discounts to steak-like cuts.

All parts of a beef carcass must eventually be sold. They cannot be stored for a long period of time unless they are frozen and even in the frozen state, they start to deteriorate after six months. There are several ways that butchers and/or meat retailers can ensure that all the beef in a carcass finds a home. These include:

- raising and lowering the price differentials among different cuts of meat (e.g., in the summer when barbecuing is popular, the price of grilling steaks rises relative to the price of beef roast; in the winter the price differential between these two cuts narrows);
- finding markets in different parts of the continent or with foreign buyers, where a type of cut that is in a “surplus” situation in one region may still be in short supply in another region. This often happens because of differing eating habits in different parts of North America (e.g., loins from cows are very popular in Montreal but not in other parts of Canada); and
- cutting large sections of the carcass into the type of cut that is most popular at the time. For instance, according to *The Joy of Cooking*, a 26 pound shortloin can be cut into a choice of club, sirloin and porterhouse steaks - which are a combination of T-bone, sirloin and fillet. But if you want five pounds of fillet from the shortloin, you must forego the porterhouse steaks, which leave you with 21 pounds of shortloin for sirloin steaks, T-bone and club steaks. (In the extreme case, all beef cuts can be sold as ground beef.)

Quality and Consistency

Given the many possible cuts and uses of beef, there are a wide range of opinions as to what constitutes “quality” in beef. If buyers are interested in grilling steaks, they may link high quality with a high degree of marbling because, in general, the more marbling, the more tender the piece of grilled meat. However, processors of ground beef may consider the effective yield of meat to be the best criteria to measure quality. This is because they have to trim out the bones and most of the surface fat from the muscles before they grind them. Marbling would generally not be desired because fat within the muscle cannot be trimmed out and a highly marbled beef carcass would give us a ground meat product with a high fat content that could not be easily reduced to a medium or low fat content product. A consumer at the retail level who wants a roast may consider that a bright red color is the best

indicator of quality because a bright red color usually indicates the animal was relatively young and has been recently killed and hence that the meat is very fresh. A soup maker may consider older animals to be the best quality since they produce the strongest and best-flavored beef soup stock. One of the most often mentioned criteria that people give as an indicator of quality is “taste and tenderness”. Unfortunately these two criteria are very difficult to quickly measure in an objective manner.

In a world of increasing industrialization and amalgamation of food buying decisions, quality is also coming to be more and more associated with the consistency of the beef carcass or the beef cut. This is a very important new component of quality and is greatly influencing how beef in North America is being perceived relative to pork and chicken, the two other major sources of meat in the North American diet.

IV. The Inherent Inconsistency of North American Beef

Industrialization has increased the demand for a wide range of consistent food products, from vegetables and fruits to dairy products and meat. In this regard, chicken and pork in North America have an advantage over beef in that they are much more consistent in texture and taste than beef. The following lists the main reasons why this is so:

1. Beef producers have very different land bases, herd sizes, climatic conditions, skill levels, labor availability, etc.;	Chickens and pigs are generally grown inside barns where the effects of climate, topography and labor availability can be minimized with the use of mechanical equipment (e.g., ventilation fans, automatic feeders);
2. Cattle slaughtered for beef can vary in age from one year old calves to breeding animals over five years old;	Most chickens for meat are sold at six to eight weeks of age and even laying hens are usually killed after two years; most pigs are sold at five to six months of age and breeding animals at two to four years of age;
3. The slaughter of mature breeding cattle makes up a significant share of the total supply of beef because each cow produces, on the average, only one calf per year and generally not more than five to eight calves in her lifetime;	The slaughter of mature breeding chickens makes up a very tiny portion of the total supply of poultry because each hen can produce three to six hundred chicks within her lifetime; the slaughter of mature breeding pigs also makes up a small portion of the total pork supply because each sow can produce from thirty to fifty piglets within her lifetime;
4. Cattle sold from the same farm at the same time can vary by several hundred pounds in weight because the calving season on a single farm can be spread over one to two months since not all cows on a cow/calf farm can be bred with bulls at the same time;	Since most chickens and pigs are kept indoors, they can be easily induced to cycle and be bred using artificial insemination on the same day - this in turn allows large numbers of chicks or piglets to be born on the same day and to be subsequently treated as one "lot" by the farmer in his barn;
5. The genetic diversity of commercial beef cattle is relatively large and ranges from large framed Charlois and Simmental to small framed Hereford and Angus to double muscled Belgian Blue to heat tolerant Brahmins;	The genetic diversity of chickens is very narrow (i.e., almost all are derived from hybrid combinations of just two similar breeds); although the genetic diversity of pigs is greater than that of commercial poultry, it is much less diverse than that of beef cattle (e.g., there is much less difference between a Tamsworth, Hampshire or Yorkshire pig than there is between large and small framed cattle breeds);

(Continues next page)

6. Cattle are fed and reared successfully on a wide variety of feed stuffs and management systems (e.g., barley silage, bush pasture, short grass prairie); and

Most chickens and pigs are raised only in barns and fed only grain based rations; and

7. The cattle supply chain from breeding animal to consumer can be very long (e.g., cow/calf producer, auction market, backgrounder, feedlot, packer, boxed beef producer or distributor, retailer, consumer). Since the beef supply can be longer than the supply chain for pigs and chickens, there are many more combinations of handling and treatment methods that have an influence on the final quality of the beef that consumers eat.

The supply chains for poultry and pork, to a lesser extent, are often quite short (e.g., in poultry a common scenario would be hatchery, broiler farm, packer, retailer, consumer).

In addition to the above mentioned factors that affect the consistency of the animals being brought to slaughter, there are also a large number of after slaughter factors which can affect the tenderness and tastiness of the beef a consumer eventually eats. Because there are many factors, the potential number of interactions of different factors on a given piece of beef are very high and hence the potential inconsistency of the beef eaten by the consumer is also very high. The following is a list of some of the more important things that can affect the beef consumer's eating experience. It should be noted that some of these factors also affect the taste and tenderness of pork and chicken but, in general, the effects on beef are much more pronounced than in pork and chicken.

All of the following items that affect meat quality can be combined with the previously mentioned factors that produce wide variations in cattle quality. With this tremendous range in potential inconsistency of a piece of cooked beef, it is no wonder that a recent survey indicated that many consumers complain about the inconsistency of beef.

- Muscle location
- Genetics
- Rate of rigor mortis
- Rate of pH decline
- Ultimate pH of the meat
- Temperature decline during storage
- Animal age at killing time
- The method in which the carcass was suspended
- The amount of enzyme activity within the muscle
- Muscle 'turnover' prior to slaughter
- Calcium content in the muscle after death
- The type and amount of electrical stimulation received during the killing process
- Sarcomere length (muscle contraction after death)
- The type and extent of aging of the carcass
- Cooking method
- Endpoint temperature

V. The Prairie Beef Producer

On the prairies we can find several major types of cow calf, backgrounder and feedlot operations. The factors which motivate these operations and their capacity to carry out certain activities will have a significant effect on the homogeneity of the beef that is produced on the prairies. Consider, for instance, cow calf producers. In Saskatchewan there are two main sizes of cow calf producers; those with fewer than 100 cows and those with more than 100 cows.

Most cow calf producers with less than 100 cows, are mixed grain and livestock farmers that get part of their income from their cattle. These farmers usually have cows because they own or have access to land which is not suited to grain production (e.g., too sandy or too stony) but can be used for pasture or hay land. Depending on their circumstances, such cow calf producers may, at times, decide to background or even feed out their calves. This is especially common when feed grain prices are low and/or when calf prices are low.

Most of these farmers also do not have off farm jobs and hence have not much to do in the winter other than taking care of their cattle. They have usually invested very little in facilities or in improving their cowherd. In the winter they substitute their labor for mechanical feeding systems and generally take the attitude that “the only real way to make money with cattle is to minimize the cash you spend on them”. Thus their cows are a way to turn poor quality land and their surplus labor into cash. In addition, many of these farmers have found that having cattle gives them a way to smooth out their cash flow from grain. Many feel that cattle prices are usually high when grain prices are low and vice versa and hence that the cattle price cycle tends to counteract the grain price cycle. Most of these farmers are not very anxious to expand or shrink their herds because:

- They often have very little in the way of mechanized winter feeding systems or handling facilities and hence feel that an expansion would require significantly more

land, labor and capital, all of which they may be unable or unwilling to provide; and

- They want to make use of the poor land and the winter labor supply that they have. If they sell their cattle, they will not have a way to turn their poor land into a stream of cash.

These small cow calf producers are at a disadvantage when it comes to maximizing what they can sell their animals for. This is because their small size generally precludes them from selling large homogeneous groups of calves (i.e., selling 50 or more calves that have similar weight, age and appearance). This is due to the fact that they:

- do not have more than two bulls and thus cannot breed more than 50 cows within one week;
- often breed their heifers to a smaller breed bull (possibly with AI) because they do not want calving problems with their heifers but then use a larger breed bull to breed their cows because they want the fast growth associated with crossbred and/or larger breed genetics, and
- cannot separate out cows or calves that are bigger or smaller than average so that they can be fed and/or treated differently.

Some of the ways that smaller cow calf producers presently use to produce a more homogeneous product are:

- produce purebred animals, particularly the smaller British breeds; and
- sell at large auction markets or cattle sales barns that are big enough that the operators pre-sort calves from a variety of producers to give the buyers lots of 25 or more animals that are of similar size, age and appearance.

On the other end of the cow calf producer spectrum, we have producers that have more than 100 cows. Generally such producers refer to

themselves as ranchers and get the majority of their income from selling cattle. Such producers are usually located in areas of the province where there are large areas of relatively poor quality land (e.g., areas around Maple Creek and Meadow Lake). These producers have made a long-term commitment to raising calves for sale and hence have often made significant investments in handling and feeding facilities. Many have changed their management practices (e.g.,

breeding system, grazing system) to raise their productivity and/or to allow them to get higher prices for their animals. These producers are often able to produce lots of 25 or more animals that are quite homogeneous and/or can be quite easily grouped together at a sales barn or by a travelling cattle buyer to produce uniform lots for backgrounding or for feedlots.

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Interview with a Small Cow Calf Producer

The interviewee has been in the cattle business for 25 years. His cow calf business was handed down to him from his father and he continues it because he sees it a good way to balance the income he gets from producing grain. He doesn't see think he will expand his cattle business but he does feel that cattle will always be in demand due to globalization and crop subsidies but thinks there are too many farmers that will switch from crops to cattle when it is no longer profitable to grow crops.

Presently his herd consists of 42 cows and one bull. He sells his cattle mainly to the local auction mart. In caring for his herd he strives for the best price at the auction market, and does not care much about what processors want. He feels, other than breeders, that there is really no loyalty to certain breeds, and that no one cares, as long as the cattle makes money for the producers. He feels that there is an increase in demand for his type of cattle in the late fall and early winter. He selling mostly yearlings and heifers but he feels that the biggest demand is for yearlings.

His feeding habits and pre-market preparations include feeding alfalfa and oats when the animals are grazing and then, one week before selling, feeding molasses with oats. His pastureland consists of 190 acres of range and Brome grass broadcast seeded due to the soil conditions.

In most cases he feels that the price he gets for his cattle is reasonable. In some cases he feels that animals are price discounted too much because of their color or appearance, even though the meat is still good. In his opinion, the beef market moves inversely with the grain market; when grain prices are high, beef prices are low and vice versa. He has noticed that there is a considerable difference in the price of cattle between smaller and larger centers in Saskatchewan. This could be due to the fact that there are more buyers in bigger centers (i.e., better competitiveness) and in the bigger centers there are also pre-sort satellite sales which increase the potential for higher beef prices, especially when the market is low in that area.

When replenishing his herd, he uses both natural births and buying from other herds. He buys only from Saskatchewan and Canadian herds due to the different feeding habits outside

Canada. When selecting cattle he looks for the following characteristics:

- cows - three to five years old, good weight;
- heifers - strong, lively, 400 - 500 pounds, eight or nine months old; and
- bulls - no horns due to dockage in the market, two to three years old, 1,000 to 1,200 pounds.

He personally produces Herefords; his family has been producing this breed all their life because Herefords have better tolerance to cold weather, better weight gain and better meat.

He sees the grading system as one sided. Because of the grading system, if the beef market is down, the price for your cattle goes down, even though it might still be useful for more than just making prime cuts. He does feel positively that even if his cattle have a lower grade, at least he can still sell it for processing. Overall he feels that to improve the present grading system, it should encompass more of the usefulness of the cow. He is seeing more and more "rail grading" being used.

He feels that the main reasons that customers are willing to pay for the services of packers, wholesalers or retailers as opposed to buying directly from him are:

- non-farm sourced meat is generally classed according to the cut, the size and the amount of marbling;
- non-farm sourced meat is generally inspected for any health problems; and
- convenience (i.e., the customer has to process anything bought from him, whereas the customer can go to the packer, wholesaler or retailer and gets a ready to cook product).

(Editor's note: There are many cow calf producers like this in Saskatchewan. This producer did not express an interest in getting bigger or better; cattle are just a method to counteract a cyclical grain market.)

Interview with a Medium Size Cow Calf Producer

This cow calf producer has made his farm on the edge of the northern forest east of Lloydminster. He has been raising cows and calves for over 30 years and his general management practices are similar, in many ways, to what his father used to do. Cows and selected heifers are kept in corrals during the winter and fed a mixture of hay, straw and grain. Calves are born in February and March and turned out with the cows onto pasture in May or June where they remain until freeze-up. Calves are usually sold in late fall but occasionally some may be backgrounded and sold at a latter date when prices are hopefully higher.

The calves are normally taken to the Heartland Livestock Auction Market in Lloydminster where animals are grouped together with animals from other farmers' herds so that each lot has 25 or more calves of a similar weight, age and breed. In his experience, the black color ones (i.e., Aberdeen Angus) usually sell at a discount while the white and buckskin ones (i.e., Charlois, Simmental and Limousin) usually sell for a premium. Even though the white and buckskin breeds usually get a premium at the auction market, he still breeds his heifers to the smaller framed breeds so that his heifers have less calving problems (the mature cows are bred to the big-framed breeds). He also feels that it won't pay him to separate or treat some animals differently than others because "it all takes work" and "anyway, I don't have extra pens or space".

This producer had an old but adequate system of corals, shed and fences. He feels he makes good money on his cattle because he can raise them with relatively few cash inputs. He has only a section of grain land and raises canola, wheat and barley. He thinks that, in his case, it is not worthwhile to feed his cattle out to slaughter weight because: 1) he would have to buy most of his grain for cash, 2) his neighbors who used to feed out their cattle often "worked like dogs" over the winter to feed their cattle and then, in the spring, the finished cattle price would drop so that "you really worked all winter for nothing", and 3) he is "not set up for it" so feeding would takes lots of labor unless he was willing to spend a lot of cash on a mechanized feeding system (which he isn't willing to do). He does not plan to expand because it would mean buying or renting more pasture and/or hay land and doing more manual work feeding cows in the winter. However, he also doesn't plan to reduce his cow numbers because, without cows, he won't have a way to get a good income from his poor land.

(Editor's note: This producer gets the majority of his net income from cows, however, he is apparently quite comfortable with his situation and has little desire to get bigger or to feed out his calves.)

Views from a Large Saskatchewan Ranching Family

This family ranch has been in the cattle business for over 30 years. They presently have about 1,000 head of cattle. It was a family business and has been passed on to the next generation. The original reason for starting a cow/calf business was because the nearest elevator was too far away to haul wheat to. In addition, the property is located on the edge of the forest area of Saskatchewan, so the only agricultural activity that seemed to be feasible was cattle farming.

The reason that they stay in the business is because of the newer partners that bring new ideas and methods of analysis. The more experienced staff are finding they can't get away with what they could 25 years ago because of today's lower profit margins. This ranch has tried three different ways to market their calves. These include:

- raising calves until they are about 600 lbs. and then selling them outright to a feedlot;
- raising calves until they are about 600 lbs. and then shipping them to a feedlot where the feedlot costs are shared between the feedlot and the ranch. The profit when the animals are slaughtered is then split between the feedlot and ranch; and
- raising calves until they are about 600 lbs., shipping them to the feedlot and contracting the feedlot to feed the cattle. When the animals are slaughtered the ranch collects all the profit (i.e., retained ownership).

The ranch has found all these methods can be profitable for him but different systems are more beneficial in different years.

The producer has been involved in a packer organized "market based system" for three years now and has collected a large amount of data which relates the genetics, feeding and management of their cattle with the final carcass quality at the packing plant. They started participating in this system because the packer pays them a premi-

um based on a packer derived yield/marbling grid and because they want to become more involved in selling breeding stock. Some of the good and bad features of this particular packer "market based system" are:

- it costs \$1.00 per 100 head to register;
- a charge of 1¢/lb is made when carcass is sold;
- 600 pound calves generate, on average, a 3¢ to 3.5¢/lb premium based on the grid system at the packer level;
- if the producer sells the calf at 600 pounds to the feedlot, but the calf doesn't grade well after it is fattened and slaughtered, the discounts aren't passed down to the producer; and
- if the producer sells the calf at 600 pounds to the feedlot, any premium paid on 600 - 1,200 pound animals is not passed down to the producer.

This ranch feels that at least 60% of carcass quality is due to genetics and hence they devote a considerable amount of effort to trying to manipulate the genetics of their herd. They will breed a larger breed with a smaller breed and keep the gene pool "thin" by breeding back into the daughters. They are also looking to have the bull battery as close as possible, so when new genetic material is introduced to a new herd it will dominate. Some of the main objectives of the system are:

- to produce beef animals and carcasses that will be a consistent trade-off between fat and lean, and that will be cost effective to produce;
- to have consistency, not only within the herd, but also from generation to generation; and

(Interview continues page 22)

- to produce a consistent gene pool so that eventually producers can make a phone call to a buyer and over the phone the buyer will be able to confidently place a bid or an order.

This ranching family feels that the present grading system is a necessary pre-condition to developing better beef production systems. However, they feel it must include a type of grid based payment system so that beef breeders have goals to shoot for that are related to the ultimate value of the end products. The grading system does as good a job as any to identify what they have. However, the ranch feels that when cheap, effective mechanization of grading is possible at the producer level, it will lead to much more

consistent readings at the producer level. This, in turn, will lead to better and more consistent, cost effective animals being produced (e.g., the producer could take a few measurements at different times and look at the past breed statistics to calculate at what weight the animal could be most profitably sold, based on past performance of genetically similar animals).

(Editor's Note: This large ranching family is getting the majority of their income from cattle. It is trying new systems of management and have the capacity and motivation to produce the consistent lots of cattle that packers are looking for.)

VI. The Canadian Grading System for Beef

Background

The primary purpose of a grading system is to separate units of a commodity into lots or batches or groupings that will facilitate the physical marketing of the commodity. Thus, the primary purpose of a beef grading system is to separate cattle carcasses into uniform groups to facilitate marketing beef into different markets. It also provides a tool for expressing and comparing prices and hence improving the efficiency of marketing and merchandising of beef. In Canada, beef grading focuses on factors that are believed to be highly correlated with beef eating quality and yield (i.e., animal maturity, sex, muscle color, fat cover around the carcass and fat marbling within the muscle).

The Canadian beef grading system was first instituted in the late 1920s. Since then numerous changes have taken place. In 1992, amendments were made to the beef grading system with the incorporation of marbling criteria. The goal was to provide consumers with improved assurance of specific quality beef. In 1996, USDA marbling cards were adopted so that Canadian beef would be graded in a manner similar to American beef and hence be better able to compete in both the U.S. and foreign markets that are accustomed to using USDA beef grading standards.

Grading

A grading system is meant to help buyers and sellers of a commodity quickly assess the quality attributes of a particular lot or batch of that commodity. For a grading system to work well, the quality attributes that are picked as the grading criteria must have economic value and meaning. In the case of the Canadian beef grading system, the emphasis is first placed on health (i.e., is this carcass safe to eat?), then on the yield of marketable beef, the age of the animal, sex, muscle and fat color and finally the amount of marbling in the carcass. Once a carcass is judged to be safe, the primary emphasis is on age, yield and marbling. This may be the result of the fact that roughly 40% of carcass

value is determined by the quality of the grilling-type steaks that can be made and, in these cuts, things like marbling are very important in determining the consumer's perception of good taste and tenderness. However, a strong emphasis on steak palatability as a quality attribute gives little incentive to beef producers to consider the need of the other markets for beef (e.g., the ground beef, pastrami and jerky markets would all be more suitably served if the grading system emphasized lean meat yield). The following Tables show several different breakdowns of how Canadian slaughter cattle were graded in 1997.

Grading Factors

Abattoirs receive either federal or provincial government meat inspection services. Even though grading is optional, the actual or expected grade and yield of a carcass determines its initial value and possible uses in the food industry. A carcass may only be graded after it has been inspected and approved for health and safety standards, and bears a meat inspection legend or stamp.

Once a carcass is approved for human consumption, the carcass is judged by looking at factors which have traditionally been associated with tenderness, juiciness, consumer acceptability, shelf life, and the yield of a carcass. In Canada, these include the following characteristics:

- *age of animals* since youthful animals generally produce more tender meat;
- *sex* since pronounced masculinity adversely affects meat tenderness;
- *muscling* since it influences meat yield; and
- *fat color, texture and marbling* since they affect consumer acceptability (color and texture) and eating characteristics (marbling).

The Canadian Beef Grades

At present, the Canadian beef grading system classifies beef into 13 categories based on the grading factors noted above. These beef grades

Table 6.1 Percentage Grade Breakdown of Canadian A Grade Cattle Ranked by Yield (Jan - Dec 97)

Grades	Yield	BC	AB	SK/MN	West	ON	QC	AP	East	Total
A	1 >=59%	13.1	12.4	14.4	12.6	20.7	34.7	23.8	22.1	14.8
AA	1 >=59%	39.1	38.7	19.5	36.8	35.5	44.3	29.5	35.6	36.5
AAA	1 >=59%	10.4	14.9	5.0	13.8	10.5	6.1	12.6	10.4	13.0
APR	1 >=59%	-	0.1	-	0.1	0.1	0.1	-	0.1	0.1
	Total	62.6	66.0	38.8	63.3	66.8	85.1	66.0	68.1	64.4
A	2 54-58%	2.7	1.1	1.6	1.1	2.5	2.3	2.3	2.5	1.5
AA	2 54-58%	16.4	11.3	4.5	10.7	13.0	5.4	7.3	11.9	11.0
AAA	2 54-58%	6.7	10.4	2.0	9.5	7.8	1.6	6.7	7.2	9.0
APR	2 54-58%	-	0.1	-	0.1	0.1	0.1	-	0.1	0.1
	Total	25.7	22.8	8.1	21.4	23.4	9.4	16.4	21.6	21.5
A	3 <=53%	0.8	0.1	0.2	0.1	0.3	0.2	0.1	0.3	0.2
AA	3 <=53%	2.0	1.6	0.4	1.5	2.5	0.8	0.9	2.2	1.7
AAA	3 <=53%	1.6	3.1	0.3	2.8	3.2	0.3	1.5	2.8	2.8
APR	3 <=53%	-	0.0	-	0.0	0.1	0.0	-	0.1	0.1
	Total	4.4	4.9	0.8	4.5	6.1	1.4	2.5	5.4	4.7
Total A Grades		92.8	93.6	47.7	89.2	96.3	95.9	84.9	95.2	90.6

Source: Canadian Beef Grading Agency

Table 6.2 Carcass Grade Breakdown of Canadian A Grade Cattle Ranked by Yield (Jan - Dec 97)

Grades	Yield	BC	AB	SK/MN	West	ON	QC	AP	East	Totals
A	1 >=59%	3,613	216,900	27,587	248,100	106,105	16,378	13,850	136,333	384,433
AA	1 >=59%	10,752	677,653	37,337	725,742	181,593	20,939	17,164	219,696	945,438
AAA	1 >=59%	2,873	260,638	9,557	273,068	53,705	2,868	7,332	63,905	336,973
APR	1 >=59%	0	1,159	0	1,159	327	44	0	371	1,530
	Total	17,238	1,156,350	74,481	1,248,069	341,730	40,229	38,346	420,305	1,668,374
A	2 54-58%	740	18,533	3,060	22,333	12,849	1,105	1,326	15,280	37,613
AA	2 54-58%	4,500	197,319	8,535	210,354	66,517	2,574	4,258	73,349	283,703
AAA	2 54-58%	1,846	182,449	3,902	188,197	39,642	745	3,918	44,305	232,502
APR	2 54-58%	0	1,543	0	1,543	528	26	0	554	2,097
	Total	7,086	399,844	15,497	422,427	119,536	4,450	9,502	133,488	555,915
A	3 <=53%	229	1,630	315	2,174	1,714	92	82	1,888	4,062
AA	3 <=53%	556	28,857	707	30,120	12,557	396	510	13,463	43,583
AAA	3 <=53%	439	54,074	521	55,034	16,244	157	855	17,256	72,290
APR	3 <=53%	0	734	0	734	559	10	0	569	1,303
	Total	1,224	85,295	1,543	88,062	31,074	655	1,447	33,176	121,238
Total A Grades		25,548	1,641,489	91,521	1,758,558	492,340	45,334	49,295	586,969	2,345,527

Source: Canadian Beef Grading Agency

Table 6.3 Percentage Breakdown of all Canadian Graded Cattle (Jan - Dec 97)

Grades	Yield	BC	AB	SK/MN	West	ON	QC	AP	East	Total
A	1 >=59%	13.1	12.4	14.4	12.6	20.7	34.7	23.8	22.1	14.8
	2 54-58%	2.7	1.1	1.6	1.1	2.5	2.3	2.3	2.5	1.5
	3 <=53%	0.8	0.1	0.2	0.1	0.3	0.2	0.1	0.3	0.2
	Total	16.6	13.5	16.1	13.8	23.6	37.2	26.3	24.9	16.5
AA	1 >=59%	39.1	38.7	19.5	36.8	35.5	44.3	29.5	35.6	36.5
	2 54-58%	16.4	11.3	4.5	10.7	13.0	5.4	7.3	11.9	11.0
	3 <=53%	2.0	1.6	0.4	1.5	2.5	0.8	0.9	2.2	1.7
Total	57.4	51.6	24.3	49.0	51.0	50.6	37.8	49.7	49.2	
AAA	1 >=59%	10.4	14.9	5.0	13.8	10.5	6.1	12.6	10.4	13.0
	2 54-58%	6.7	10.4	2.0	9.5	7.8	1.6	6.7	7.2	9.0
	3 <=53%	1.6	3.1	0.3	2.8	3.2	0.3	1.5	2.8	2.8
Total	18.7	28.4	7.3	26.2	21.4	8.0	20.8	20.3	24.8	
APR	1 >=59%	-	0.1	-	0.1	0.1	0.1	-	0.1	0.1
	2 54-58%	-	0.1	-	0.1	0.1	0.1	-	0.1	0.1
	3 <=53%	-	0.0	-	0.0	0.1	0.0	-	0.1	0.1
Total	-	0.2	-	0.2	0.3	0.2	-	0.2	0.2	
B1		1.8	0.6	2.1	0.8	1.1	1.7	2.2	1.2	0.9
B2		0.6	0.0	0.5	0.1	0.1	0.1	0.1	0.1	0.1
B3		1.3	0.2	0.6	0.2	0.2	0.7	6.2	0.8	0.4
B4		0.5	0.6	0.7	0.6	1.8	0.4	0.7	1.6	0.9
Total	4.2	1.4	3.9	1.7	3.1	2.9	9.2	3.7	2.2	
D1		0.7	0.6	6.2	1.2	0.2	0.4	0.1	0.2	1.0
D2		1.6	2.7	27.3	5.0	0.2	0.1	2.5	0.4	3.9
D3		0.0	1.2	11.9	2.2	0.0	0.1	2.2	0.2	1.7
D4		0.2	0.3	2.3	0.5	0.1	0.0	0.4	0.1	0.4
Total	2.6	4.8	47.7	8.9	0.5	0.6	5.2	0.9	7.0	
E		0.4	0.2	0.6	0.2	0.1	0.6	0.7	0.2	0.2
Math Check:		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
% Graded		59.0	91.6	97.9	91.5	72.9	21.4	68.6	61.2	81.8
% Ungraded		41.0	8.4	2.1	8.5	27.1	78.6	31.4	38.8	18.2
Total Slaughter		46,621	1,913,633	195,826	2,156,080	701,618	221,208	84,717	1,007,543	3,163,623
% Rail Graded		53.7	13.4	59.8	18.5	53.3	17.1	48.5	45.0	26.9

Source: Canadian Beef Grading Agency

Table 6.4 Carcass Grade Breakdown of all Canadian Graded Cattle (Jan - Dec 97)

Grades	Yield	BC	AB	SK/MN	West	ON	QC	AP	East	Totals
A	1 >=59%	3,613	216,900	27,587	248,100	106,105	16,378	13,850	136,333	384,433
	2 54-58%	740	18,533	3,060	22,333	12,849	1,105	1,326	15,280	37,613
	3 <=53%	229	1,630	315	2,174	1,714	92	82	1,888	4,062
	Total	4,582	237,063	30,962	272,607	120,668	17,575	15,258	153,501	426,108
AA	1 >=59%	10,752	677,653	37,337	725,742	181,593	20,939	17,164	219,696	945,438
	2 54-58%	4,500	197,319	8,535	210,354	66,517	2,574	4,258	73,349	283,703
	3 <=53%	556	28,857	707	30,120	12,557	396	510	13,463	43,583
	Total	15,808	903,829	46,579	966,216	260,667	23,909	21,932	306,508	1,272,724
AAA	1 >=59%	2,873	260,638	9,557	273,068	53,705	2,868	7,332	63,905	336,973
	2 54-58%	1,846	182,449	3,902	188,197	39,642	745	3,918	44,305	232,502
	3 <=53%	439	54,074	521	55,034	16,244	157	855	17,256	72,290
	Total	5,158	497,161	13,980	516,299	109,591	3,770	12,105	125,466	641,765
APR	1 >=59%	0	1,159	0	1,159	327	44	0	371	1,530
	2 54-58%	0	1,543	0	1,543	528	26	0	554	2,097
	3 <=53%	0	734	0	734	559	10	0	569	1,303
	Total	0	3,436	0	3,436	1,414	80	0	1,494	4,930
B1		494	10,468	4,001	14,963	5,435	809	1,253	7,497	22,460
B2		155	657	944	1,756	323	29	84	436	2,192
B3		367	2,714	1,222	4,303	1,278	323	3,605	5,206	9,509
B4		150	11,322	1,320	12,792	9,068	200	384	9,652	22,444
Total		1,166	25,161	7,487	33,814	16,104	1,361	5,326	22,791	56,605
D1		180	11,198	11,877	23,255	1,121	212	66	1,399	24,654
D2		443	46,738	52,382	99,563	822	41	1,474	2,337	101,900
D3		12	20,515	22,858	43,385	149	35	1,251	1,435	44,820
D4		68	4,834	4,374	9,276	323	12	256	591	9,867
Total		703	83,285	91,491	175,479	2,415	300	3,047	5,762	181,241
E		103	2,961	1,219	4,283	607	267	428	1,302	5,585
Math Check:		27,520	1,752,896	191,718	1,972,134	511,466	47,262	58,096	616,824	2,588,958
Graded Total		27,520	1,752,896	191,718	1,972,134	511,466	47,262	58,096	616,824	2,588,958
Ungraded		19,101	160,737	4,108	183,946	190,152	173,946	26,621	390,719	574,665
Total Slaughter		46,621	1,913,633	195,826	2,156,080	701,618	221,208	84,717	1,007,543	3,163,623
Rail Graded		25,015	256,811	117,138	398,964	374,095	37,878	41,050	453,023	851,987

Source: Canadian Beef Grading Agency

are shown below. In addition, we have shown the percentage of Western Canadian beef that fell into each grade in 1997:

- Canada A (13.8), Canada AA (49.0), Canada AAA (26.6), and Canada Prime (0.2) (each of which is further broken down into three levels of lean meat yield);
- Canada B1 (0.8), Canada B2 (0.1), Canada B3 (0.2), and Canada B4 (0.6);
- Canada D1 (1.2), Canada D2 (5.0), Canada D3 (2.2), and Canada D4 (0.5); and
- Canada E (0.2)

The quality attributes of cattle that fall into these grades are as follows:

Canada A, Canada AA, Canada AAA, and Canada APR

These are the highest quality Canadian beef grades. Canada Prime was added officially as a grade in August 1997 to give Canada a new beef grade that would be able to compete with the more marbled “Prime” grade used for beef in the USA. The grade criteria for these four grades are identical except for marbling content. The identical features are:

- youthful animals (less than 30 months of age at slaughter);
- good to excellent muscling;
- firm muscles;
- bright red meat color and firm textured rib-eye muscle; and
- minimum of 4 mm of thickness of external fat at the rib-eye measurement site and the fat must be firm or no more than slightly tinged with reddish or amber color.

The marbling content is used to distinguish

between these four grades. Beef with trace marbling is categorized as Canada A grade while Canada AA, AAA and APR grades have slight marbling, small marbling and slightly abundant marbling, respectively.

The “A” grades of cattle in Canada are, by far, the largest grouping of cattle that are slaughtered and sold primarily for high valued fresh and frozen cuts of beef (e.g., steak). Once these carcasses are given an “A” grade designation, they are also generally assessed for lean meat yield. The yield is determined by measuring exterior fat thickness as well as the length and width of the rib-eye muscle using the equation:

$$\text{Lean \%} = 63.5 + 1.05(\text{muscle score}) - 0.76(\text{grade fat})$$

After each carcass is measured and the Lean % is calculated using the above formula, each yield-graded carcass is put into one of the following categories:

- Canada 1 - carcasses with 59% or more of lean useable meat;
- Canada 2 - carcasses with 54 - 58% of useable meat; and
- Canada 3 - carcasses with 53% or less of useable meat.

Packers and beef processors usually pay a premium for carcasses which give them a higher meat yield (i.e., Canada 1 carcasses are usually priced slightly higher than Canada 2 carcasses and Canada 2 carcasses are usually priced slightly higher than Canada 3 carcasses).

Canada B1, Canada B2, Canada B3, and Canada B4

These grades are obtained only from youthful carcasses which do not meet the minimum quality requirements of the Canada “A” grades. These could come from young dairy animals or beef animals that had to be sold before they started putting on fat. Most grass fed animals, such as

those from New Zealand, Australia and Argentina would fall into the B grades if they were sold live in Canada.

- *B1 carcasses* show good to excellent muscling with no deficiencies. The rib eye muscle is firm and bright red. The fat is firm and white or amber in color. The fat measure is less than 4 mm and/or there is no marbling;
- *B2 carcasses* have deficient to excellent muscling. The rib eye muscle is bright red and there are no requirements for marbling. Fat color is yellow and there is no fat measure requirement;
- *B3 carcasses* have deficient to good muscling. The rib eye muscle is bright red. There is no requirement for marbling. The fat is white or amber in color and there is no fat measure requirements;
- *B4 carcasses* have deficient to excellent muscling. The rib eye muscle is dark red and there are no requirements for marbling, fat color, texture or fat measure.

Canada D1, Canada D2, Canada D3, and Canada D4

Mature animals (over 30 months of age) fall into the Canada D grades and there are no requirements for either the rib eye muscle or for marbling. The D grades are basically for cow carcasses. Their carcasses are primarily used for ground beef or processed beef products. Specifically:

- *D1 carcasses* have excellent muscling. Fat is firm in texture and white or amber in color. The fat measure must be less than 15 mm;
- *D2 carcasses* have medium to excellent muscling. Fat color is white to yellow. The fat measure must be less than 15 mm;
- *D3 carcasses* have deficient muscling. There are no requirements for fat color or texture.

The fat measure is less than 15 mm; and

- *D4 carcasses* have no requirements for the muscling, fat color and texture. The fat measure is 15 mm or more.

Canada E Grade

Canada E grades are reserved for mature bulls or youthful carcasses showing pronounced masculinity. These carcasses are primarily used for producing ground beef or processed beef products.

This description of the Canadian grading system shows how emphasis is placed on the physical characteristics of the animals being slaughtered. We can see that most of the emphasis is placed on the age, sex, and amount and distribution of fat deposits, the color of the fat and the color of the muscle within the carcass. Most of these traits can be influenced on the farm by the choice of genetics, feeds and feeding systems.

Unfortunately many other factors in the supply chain of beef products can greatly influence the ultimate eating experience that a consumer experiences. None of these production practices or factors are reflected in the present Canadian beef grading system.

VII. Disappointment and the Present Canadian Grading System

According to Rhodes (1987), *grading* is the subdivision of a commodity into classes, each of which has distinctive acceptability to a significant group of buyers. The sorting is done according to a set of criteria called *grade standards* and the resulting classes or groups are called *grades*. Grades are useless unless they conform to differences in demand. Whether and by how much these grade classes are different in market price depends on the relative supply and demand for the grades in question. In the final analysis, the true value of a particular lot or grade depends upon the value of the final products which can be made from that item. It seems obvious therefore

that grading on the basis of the final products cannot help but be the most accurate indicator of true value.

Assuming that there are varying qualities of a commodity being produced and demanded, the task of the marketing system is one of matching supply to demand. One might imagine a system by which every unit of a commodity—for example, tomatoes—is inspected by every buyer in order to obtain the best possible matching of quality produced with the qualities demanded. However, such a system is not usually physically possible, and it would often be extremely expensive.

The market system has developed some shortcuts. Grading is one of these shortcuts. Assume that fresh tomatoes were subdivided into three grades. The market system then gives each buyer the choice of these three grades rather than the infinite variety of fresh tomatoes that are actually available. In this case the grading system has limited the buyer's choices, but for most buyers, it has probably been a very cost-effective trade-off because most buyers do not have the time or money to be procuring commodities, one at a time. The minute differences in attributes do not influence acceptability and are not "quality differences" in any meaningful economic sense (i.e., the cost of a more thorough search would not be justified by a significant increase in the average quality).

Tomek and Robinson (1990) point out that the design of a grading system should consider those quality attributes and defects that are economically important to buyers. However, when a commodity has a variety of users and buyers that place different values on particular attributes, a simple, consistent grading scheme may be difficult to design. In addition, although some attributes may be very important in the eyes of the buyer, that attribute may be very difficult and/or expensive to measure (e.g., taste, pesticide residue). This helps explain why official grades sometimes do not measure attributes that would be very useful to some or even all buyers and that the "best" grade by official standards is not the best for all buyers.

In his book, Rhodes (1987) points out that

grades, as standardized descriptions, are not developed and used solely for the benefit of the ultimate consumers. In fact, the impetus for grading has often come from traders of commodities rather than from ultimate consumers. This is because a grading system allows traders to make binding contracts without the need for personally inspecting each shipment or lot. It also gives credit agencies, futures markets, and even the supervisors of agribusiness employees an independent way to assure the quality of commodities being bought and sold in the marketing channel. In light of the above theoretical points about grading systems in general, let us consider some of the characteristics of the present beef grading system in Canada.

Consumers are sometimes disappointed with the steaks that they eat. Steaks are the single most valuable cut of meat sold from a beef animal and can represent over 40% of the total value of the carcass, especially during the summer barbecue season. Thus consumers' perceptions of steak have a great deal of bearing on their overall perception of beef. Most consumers like the taste of beef and will agree that a well-grilled steak is one of the best meat eating experiences they have ever had. However, their big complaint is that their steak eating experiences have not been consistent; sometimes the steak is just great and sometimes it is tough. In a previous section we have outlined the many and varied factors that can contribute to the inconsistency of the beef eating experience. Certainly the method and skill of the cook are extremely important in determining the ultimate taste and tenderness of a beef oriented meal. Are consumers just sloppy and inconsistent cooks some of the time? Possibly, but the same type of complaints come from large and small restaurants who generally have professional cooks and/or very standardized cooking methods for a particular cut of beef. Thus inconsistency of beef products cannot be merely the fault of the cook.

There is no doubt that a large amount of inconsistency in beef is a result of the wide variation in the type of cattle that are killed in Canada for beef. Cow/calf producers, backgrounders, auction markets and feedlots can all do things

that will improve the consistency of beef that are slaughtered. However, all biological products have variation and it is part of the grading system's job to effectively organize individual units of a commodity into lots or batches that are useful or meaningful to buyers. In doing this, the grading system must be able to cheaply and easily identify and measure characteristics that the ultimate users feel are important. If the trait in question cannot be easily or cheaply measured, then one or more "proxies" must be found that can be measured easily and cheaply and that is highly correlated with the real trait of importance.

The following information was gleaned from Tables 6.1, 6.2, 6.3 and 6.4 shown previously. We can use them to help us make several observations about the present Canadian beef grading system. First of all, we can see that, of the just over three million cattle slaughtered in 1997, only 82% were given a grade (i.e., 576,000 were ungraded). Most of these ungraded cattle originated in Quebec (79% of a total slaughter of 221,000) and Ontario (27% of 701,000). Smaller numbers came from the Atlantic Provinces (31% of 85,000) and BC (41% of 47,000). These provinces are Canada's major dairy areas and many of these ungraded cattle are dairy animals, which would generally fall into the D grades. Most of these ungraded carcasses are sold locally and used for grinding and processed meat products (e.g., Montreal smoked beef).

Alberta and Saskatchewan are Canada's two major sources of beef animals and hence have a large number of cow/calf producers. This means that they are also major suppliers of cow beef (i.e., from animals more than 30 months old). Unlike the rest of Canada, almost all this cow meat is graded when it is slaughtered. Surprisingly almost half of the graded beef meat produced from Saskatchewan² is cow meat (i.e., 48% of 192,000 head). Alberta produces roughly the same amount of cow carcasses (i.e., 5% of 1,752,000) but because the total slaughter is ten times as much as Saskatchewan, the percentage of cow meat is about one tenth that of Saskatchewan. Thus, although Saskatchewan is the second largest producer of beef cattle in

Canada, most of the beef calves go to Alberta for slaughter. The cows, on the other hand, are usually slaughtered in Saskatchewan after they are culled.

The majority (about 90% of 1,972,000) of beef in Western Canada falls into the A grades and hence is very suitable for breaking up into cuts for the retail trade and hotel, restaurant and institutional (HRI) markets. In addition, over 63% of it falls into the Canada 1 category of meat yield (i.e., >59% yield). Roughly 37% of all carcasses fall into the single grading class AA1 (i.e., 726,000 carcasses). At the other extreme, we can see that only 3,436 carcasses graded APR. Although there are 21 grade yield combinations, the biggest three combinations include 63% of the carcasses, the biggest seven combinations included 88% of all carcasses (i.e., the other 14 combinations only include the remaining 12% of the carcasses).

Now consider that if farmers get a price premium, it is generally only yield and weight related and not marbling related. The marbling designations (i.e., A, AA, AAA and APR) appear to only assist buyers to tell a packer what type of marbled carcass they are looking for. There is no mention of the frame size of the animal. People in the HRI trade say they want small carcasses so that the price of the complete meal is within a moderate price range. However, the grading system gives them very little clue as to what size animal it came from. At present, buyers cope by specifying the weight of the subprimal cut (e.g., the loin) or the carcass that they want.

The grading system also does not indicate the length of time the carcass has aged after being killed; yet aging is known to generally have a tenderizing effect on beef. This may not be a big problem in that the date is usually put on the box when subprimal cuts are packed and put into boxes. Boxed beef is supposed to "age" as well as beef carcasses hanging in a cooler, so if a retailer wants aged beef he can just make sure he leaves the subprimal cut wrapped in plastic in the box until the desired number of days are reached. However, some people in the meat industry argue that beef cannot properly age in bags since it is then protected from air-borne microbes

which speed up and improve the aging process as they grow on the surface of the meat and release enzymes to assist them in obtaining nutrition from the meat.

In a perfect world, we would have a simple and cheap technique to measure tenderness and tastiness as the carcass is being graded. Each carcass could then be given a grade for tenderness and tastiness and similar lots with the same tenderness or tastiness could be sold together. Unfortunately until such technology becomes cheap, we will have to continue to rely on proxies. In the case of tenderness and taste, the degree of marbling appears to be one of the quickest and easiest proxies to measure, even though some have said it is less than 70% correlated with tenderness.

Does the current grading system do a good job of passing on information to cattle producers as to what type of beef is most desired by consumers? The answer is beyond the scope of this analysis, but probably it is neither a strong yes nor a strong no. Cattle that produce a higher yield of meat sometimes get a slightly higher price premium per pound and hence producers have a small incentive to produce carcasses which have higher lean meat content. However, there is generally no direct link to the price a producer gets and the amount of marbling. Producers have an incentive to produce fat beef because of the extra weight they can sell; not because their animal was graded AAA³.

The beef grading system does not directly address the issue of trying to get consistent size carcasses and hence consistent size cuts because it does not have any upper or lower limit as to the size of carcasses that can be accepted within a grade designation. This is different than the Canadian hog grading system, which has both upper and lower weight limits. In the case of the hog index, discounts kick in after about 240 pounds live weight because packers, processors and customers generally do not want carcasses or equivalent retail cuts above this size. Although some beef packers currently discourage large and small carcasses with discounts, the beef grading system does not have any type of dis-incentive and historically carcasses have been getting

bigger and bigger. Many cattle producers would argue that having upper and lower live weight limits would favor some breeds over others. This could be true, but they should also remember that inconsistently sized beef cuts have to compete with consistently sized poultry and pork carcasses and cuts.

For many buyers the ideal carcass weighs about 700 pounds and grades AAA1. Unfortunately this is difficult to do since high marbling is generally associated with a high percentage of trimable fat (i.e., fat around the outside of the muscles) and a high percentage of trimable fat means that the percentage of lean meat goes down. In most animals the marbling fat is the last to be deposited and hence a high degree of marbling generally only comes after a good layer of outside muscle fat has been laid on.

From society's point of view, there is a considerable waste of grain if it is used to put on the last pounds of weight on a beef animal to really give it a good "finish." As more fat is laid down, the beef animal goes from A to AA to AAA and perhaps even to APR. This finishing puts marbling into the steaks which is useful when steaks are grilled but questionable for other cooking methods and other cuts of beef. Besides marbling, this finishing also puts on extra weight around the outside of the muscles in the form of fat that is later trimmed off. In 1997, such fat was worth only about C\$0.25 to 0.30/pound while the cost of the feed to put it on probably cost C\$0.30 to 0.40/pound.⁴ Of course, from a feedlot's point of view, the fat is sold at the same price as the whole carcass (say C\$0.90 per pound) and hence there is an incentive to keep feeding the animals. From society's point of view, a breed of animal that marbles easily may be less wasteful than packing on the fat that is later trimmed off to get a good degree of internal marbling.

(Text continues page on 35)

Interview with an Operator of a Small Urban Bar/Restaurant

The restaurant in this example has a 40 seat dining area and a 30-seat bar in a strip mall in a residential area near the outskirts of Saskatoon. The cook of this bar/restaurant has been in the restaurant business for 25 years. She trained as a cook and has never had the desire or need to leave the industry. She sees the demand for restaurants increasing, but the supply decreasing. In her eyes, the decline in the supply of restaurants is due to the fact that regulations for restaurant operations have become more stringent, and labor laws have become more of a burden.

The cook feels that her customers enjoy going out and often do not have enough time to cook at home. Her customers are mainly “meat and potatoes with bread” kind of people from farming communities. They are moderate spenders and the number of times they go out per week has declined over the years. Her customers’ demands are generally for beef and chicken dishes and this demand has remained quite constant for many years.

The cook purchases her beef through a single distributor. The beef is pre-cut due to the lack of

facilities in the restaurant. The only direct contact with producers is when she contracts for lamb from producers. The main types of beef purchased includes ground beef, roast and boneless backs. Hamburgers are the most commonly sold meal in the restaurant. To her knowledge, all the beef she buys is from grade A beef. The breed of the beef does not matter to her, as long as the feeding practices are all similar. When selecting beef, she says it is important to have consistency and quality, to not be too fatty, and to have a good yield. The price is somewhat important, but mainly “the same portioning” is the deciding factor. For eleven years the restaurant has purchased the same types of products and there has been no need for a change.

(Editor’s Note: The cook in this interview would fall into the beef market segment that might be labeled “It better be good.” She buys beef that does not require further cutting because she does not have a very elaborate kitchen and she places more emphasis on the consistency of the serving than on the price.)

Interview with the Operator of a Restaurant/Bar in a Large Town

The restaurant in question has a 30 seat dining area and a 75-seat bar in a northern Saskatchewan community. The cook of this big country town restaurant has been in the restaurant business for 20 years. She finds that the food industry has changed so much over the years that it is hard to keep up. She likes cooking, making contact with people, being knowledgeable, and will never stop learning about the food industry. She feels that the restaurant industry is definitely a growing market, and it has to grow because families are becoming two income families and will have no time for home preparation. She is constantly seeing new restaurants being opened. She feels that the method of preparation of beef is more important than the cut of the beef.

Her customers are generally “meat and potatoes” people from the rural area nearby. They are repeat customers, and purchase high cholesterol and higher priced meals. Customers purchase beef more than any other meat but the customers do have a price range so high-end beef is out of the question. The customers buy from the restaurant because of the service, taste, atmosphere and the chance to relax. Customers also feel that at the restaurant they can get different flavors and combinations of meals than they can prepare at home. The cook does not see the pre-prepared meals in the grocery stores as competition to her meals because the store bought meals are high in preservatives and don't give consumers much choice.

Food sales in the restaurant increase by approximately \$100,000 every year. The restaurant purchases only grade A beef; there is no other grades shown on the menu. Beef is purchased from a local butcher who has purchased it from Intercontinental Packers in Saskatoon. When purchasing beef for the restaurant the cook looks for tenderness, leanness, good color, marbling, taste, and fine texture.

She suggested that the grading system could be improved if it could reflect the aging and size of the animal. The cook complained that the present beef grading system doesn't reflect the appearance and the size of cuts. At the present time the size of the cuts they get varies because the local butcher does not always get carcasses that are the same size. The breed of the animal doesn't matter as long as it is consistent in size and it is not a larger breed. The main types of beef cuts that are purchased include New York strip, strip sirloin, inside roast and ribs. The inside roasts are cut into portions. The most popular meals are roast beef, steak and hamburgers, with their biggest seller being an 8-ounce New York strip steak.

The restaurant doesn't buy many cuts; instead they will purchase a 10-12 pound New York strip sirloin and cut it into pieces in the kitchen. They will never buy frozen, but may freeze it on site. Preparation spices include garlic, thyme, white pepper, and margarine. Preparation methods involve such methods as dry cooking and no marinating to preserve the natural taste. The pricing of beef is reasonable if it is “shopped around for”. This method has proven to be very cost effective because they can prepare their own cuts. The restaurant has tried pre-portioned packaging. They found that because it was already seasoned and prepared, it was old, tough, and dry tasting. They feel that you can't replace fresh meat because the juices are needed in food preparation.

(Editor's Note: This establishment would be an example of a market segment that might be called “I'll take some beef.” The cook is somewhat disappointed with the present beef grading system but she would not be willing to pay much of a premium for better grading. This is because her large kitchen and freezers give her ways to cope with the beef she gets with the existing beef grading system.)

Views of a Meat Brokerage Company Selling to the Mid Range (“I’ll take some beef”) HRI Trade

The company started as a family owned operation and has been in the business of distributing beef for approximately 30 years. The company used to slaughter its own meat but find that it is now more cost-effective to buy from processors. The company has eight district offices and they are still growing. They see their market as a mature one, however, because of the network they have built up, they have been able to ride out low markets in any of the individual districts and to reduce costs by volume buying.

They use “certified premium” grade (i.e., top 5% of AAA), and don’t sell A grade. They feel that the grading system is very good now that it has changed. The old Canadian grading system was very vague and most grades included a large variance of product. The grading system could be further improved if there was more technical support and information supplied by the beef information centers. An improvement to the grading system that would benefit them would be if it differentiated between larger and smaller framed animals as they prefer smaller animals since this reduces the cost of the portions that they prepare for their customers.

When they source their beef they want:

- a processor they can trust;
- a processor who will substitute to a grade up but not to a grade down;

- to buy from American companies, due to their feeling that American packers are the only companies that consistently grade their beef; and

- beef cuts from small-framed animals like the old British breeds.

The color of the meat and the number of possible varieties of cuts are not important when selecting their beef, however, Angus heifers are their preferred source of cuts. They feel that the pricing of beef is reasonable; in the case of a cattle price fluctuation, they can pass it on to the customer.

Their customer base consists mostly of independent restaurants; these restaurants are more concerned about the price rather than the quality - “They want high end products at low end prices”. The main reason that customers buy directly from a brokerage rather than from a processor or a farmer is that the customer (i.e., mostly restaurants) aren’t equipped to process the different cuts. Some of the selections that they sell are strip loin, New York, tenders, and ribs; they don’t handle chucks. Their biggest seller is strip loin.

(Editor’s Note: This wholesale purveyor of beef cuts wants cuts from small-framed animals so that the cost per serving does not get too high. They want consistent quality and size and feel they can only get this from American packers.)

VIII. Increasing the Demand for Beef

Almost all the beef produced in Western Canada is consumed in North America or Japan. In terms of meat products, these markets are highly developed and mature. However, people's lifestyles and incomes continue to change and these changes will continue to impact the amount of beef that people are eating. The American market is, by far, the biggest beef market that affects the price and demand for prairie cattle, so we should consider some of the major changes that have taken place in it. The following table shows how the per capita consumption of the different sources of meat has

the saturated fats associated with red meats. A third factor in these shifts has been the emergence of more new consumer products based on poultry meat and pork than on beef. A fourth reason revolves around the emergence of fast food franchise restaurants as major suppliers of "meal solutions." These restaurants had to search for raw meat products that were relatively cheap, available in large quantities and were very consistent in physical attributes. Their search led them to ground beef for hamburgers and fried chicken pieces, chicken strips, chicken nuggets and chicken fingers.

Is this trend likely to continue? The answer depends on how people's tastes and preferences

Table 8.1 Per Capita American Meat Consumption

(Based on pounds of retail weight equivalent)

	1960	1970	1980	1990
Beef	63.4	84.6	76.6	67.8
Pork	59.1	56.0	57.3	49.8
Veal	5.0	2.4	1.5	1.3
Lamb	4.2	2.9	1.4	1.5
Chicken	27.9	40.6	48.8	63.0
Turkey	6.3	8.1	10.3	17.6
TOTAL MEAT	165.9	194.6	195.9	201.0

Source: AMI Foundation's 1995 "Yellow Pages" edition

changed since 1960 in the USA. We can see that per capita beef consumption rose 20 pounds from 1960 to 1970 but dropped almost 20 pounds by 1990. Pork consumption fell slightly, while in recent years chicken and turkey figures have risen substantially. Since total meat per capita meat consumption has changed very little since 1970, this means that poultry products have taken away a significant market share from beef.

One of the reasons for this is the drop in the prices of chicken and turkey, relative to beef and pork in the USA due to the introduction of a variety of new technologies that led to a significant drop in the retail cost of poultry products. It was also partly due to consumers purchasing more "white meat" because they wanted to avoid

change over time and also how these products change, relative to each other. The relative price ratios of these meat sources will certainly have a big influence but so also will changes in the type of products that are made from these products. More and more of today's consumers are getting food from a bag, a box, a tin or a phone book. More and more people do not know what they will eat for supper an hour before suppertime. The phrase "time is money" is becoming more dominant as a factor affecting consumer's meat selections. Many consumers no longer want a "meat solution"; now they want a "meal solution."

Food processing firms are coming up with more combinations of quick cooking meat courses combined with vegetables, carbohydrates and

deserts (i.e., new versions of the TV dinner concept). Franchise-type restaurants are continuing to grow in popularity and they continue to come up with new products and new meal combinations. These trends mean that more and more meat is being purchased, processed and often cooked by industrial or semi-industrial systems with relatively skilled labor. To make these processing and food preparation systems work effectively, they must have a very consistent, relatively cheap, raw meat product. Poultry meat fits these requirements very well. For instance, traditionally almost all turkey was

consumed in the form of whole turkey carcasses purchased and roasted at home by consumers at Thanksgiving and Christmas. This market still exists but now we can find an assortment of turkey deli and luncheon meats with different flavors. It is even diced and put in ready to eat salads and soaked in brine and smoked to give a good imitation of ham.

It is doubtful if the turkey of the 1990s has become tastier than the turkey of the 1970s. It is doubtful that people are buying more whole turkey carcasses for roasting. A more likely explanation is that consumers switched to more turkey

Opinions of a Meat Retailer Who Sells to Low and Mid Range (“It better be cheap” and “I’ll take some beef”) Retail Customers

The interviewee manages the meat section of a medium size supermarket run by a chain in an urban area dominated by retirees and people with low to middle income jobs. He started working at this location 14 years ago and has seen the customer base grow significantly due to new housing developments nearby. Originally beef products occupied more than 50% of the space in their meat counters but now it is roughly 25% for beef, 25% for pork, 25% for poultry and 25% for processed meats (some of which are beef).

They used to buy whole carcasses of beef and cut them up but now they just order “boxed beef” that meets the specifications of their head office. These specs generally mean they get carcasses from small and medium framed animals that are mostly AA or AAA and have already been quite well trimmed.

Many of their customers are retired or with lower incomes and do not like to buy the big cuts that come from large animals. Most of the boxed beef is now boneless with the exception of pieces of shank, T-bone steaks and rib steaks. These still come with bones in because many of his customers want beef bones to make soup with. The store buys trim already “once ground” in sealed Cryovac bags. Before they sell it as ground beef or hamburger patties, they grind it once more and have had no problems with contamination or spoilage with buying a pre-ground product.

If boxed beef was not purchased, the meat section in the store would have to expand from five to roughly fifteen employees and additional building space would be needed. He feels that boxed beef is priced competitively enough so that there is no real incentive to cut up carcasses in the store anymore.

In the spring of 1998, with the urging of the Beef Information Center and his store’s head office, they started laying out their beef cuts into sections “for grilling”, “for simmering”, “for marinating” as well as labeling each beef cut with this designation and a generic recipe for cooking. At first some customers were confused and asked a lot of questions. They thought that the signs meant that this cut of meat could only be cooked in one way (i.e., in a way that they were not used to), however, things have calmed down now. Since installing the signs, he has not noticed any increase or decrease in beef consumption relative to other meats.

Editor’s Note: This retailer wants cuts from small-framed animals so that they cost per package does not get too high for the many retired customers that they have. They get reasonable consistency by buying boxed beef that fits the specifications made and circulated by the retail chain’s head office.

and less beef because: 1) turkey is not a red meat, 2) the relative price of turkey dropped, and 3) many new turkey products were developed that easily fit into the life-style trends of the 1990s (e.g., small, easy to prepare, portions). We could list the same reasons for chicken and, in the case of chicken, we could add that restaurant chains and fast food outlets have heavily promoted chicken. Chicken meat processors have come up with even more new products than turkey processors. If the beef industry is to gain or just maintain its share of the North American meat market, it must learn from the experience and history of the poultry industry in the last thirty years. One of the most important lessons to take home is that, in the 90s, a “quality product” has come to mean a product that has very consistent characteristics.

IX. Increased Demand for Consistent Quality Beef Products

Like many other consumer products, consumers have shown an increasing desire to buy fresh and processed meat products that have high levels of homogeneity (i.e., consistency). This consistency not only concerns itself with taste and tenderness, but also includes consistency of physical characteristics like, size, weight and fat content. Large hotels, restaurants, institutions and processors that rely on machines and unskilled labor to prepare their products have been at the forefront of this drive for more consistent physical meat products. Consider the following three examples.

A food-catering establishment often has a meat-slicing machine. Such a slicing machine can be set up so that it slices ham much faster and much more evenly than a butcher does, but it can only produce a high output of sliced ham if the pieces of ham going into the machine are all the same size. For the second example, consider the typical fast food establishment. An unskilled, newly hired worker can produce acceptable chicken nuggets if he follows the instructions concerning how to thaw the nuggets, fry the nuggets, and serve the nuggets. However, he can

only do this easily and consistently if the chicken nuggets are physically almost identical. In a third case, think about companies which are preparing prepackaged full meals that consumers can purchase and take home to reheat and serve in less than twenty minutes. The pieces of meat used in such full meals must not only look similar in each package; they must also “cook up” consistently in less than twenty minutes.

In the first example the move toward increased mechanical processing has led to a heightened demand for physically consistent meat. In the second example, the growing popularity of fast food restaurants and franchises has led to an expectation on the part of consumers for a consistent eating experience, even if most of the staff at these establishments are unskilled and only work part-time. In the third case, the full meal packages must be consistently the same if the retailer is to expect repeat business

Consumers and institutions often search for a ‘proxy’ or a signal that tells them they will get a physically consistent product. This urge for a quick symbol of consistent quality has led to the emergence of ‘branding’. Such branding can range from a processed food product sitting on a shelf (e.g., Heinz ketchup), to branding of a raw food product, (e.g., BC Fruits Macintosh Apples, Certified Black Angus Beef). When consumers search for a particular brand, they generally are most concerned that the brand “lives up to its reputation”. This does not mean that the particular brand is the tastiest or the thickest or the leanest but rather that it gives you what you expect, time after time.

Consumers, restaurants and processors of beef products all complain about the inconsistency of beef cuts and carcasses. Demand could, no doubt, be increased if the consistency of beef was improved. Branded beef and/or vertically integrated supply chains are attempting to do this. A more refined grading system with weight ranges or improved, viable palatability measures would also improve the situation.

X. General Techniques to Increase Consistency of Products

Since the industrial age began, suppliers of raw materials have searched for ways to make heterogeneous raw materials (i.e., those having a wide range of physical properties) into something which is more homogeneous (i.e., more even or consistent). The following is a list of techniques that have been used to process a given raw material into a form that is more consistent and hence more valuable to industrial processors:

- cut the raw material into small pieces, blend the pieces together and reconstitute into a homogeneous product (e.g., hamburger, relish from vegetables, paper made from wood chips);

- purchase raw material from many widely separated areas and then blend all the raw material together before processing so that changing conditions in one area do not significantly affect the final quality of the blend (e.g., national coffee brands like Nescafe or Maxwell House);

- insure that the transformation process that turns the raw material into a product is as consistent as possible by precisely writing down each step of the transformation process and then ensuring that the transformation process never varies from the steps that have been written down (e.g., the ISO 9000 quality system or the McDonald's system of getting hamburgers to be the same around the world);

A New Retail Beef Product

A steer still looks like a steer but, when the sirloin from that steer appears in the meat market, it may be in an exotic disguise. This spring, for example, Nestle's Stouffer brand launched two new home meal replacement beef meals: Thai and Szechwan Beef stir kits. This made beef 33 per cent of Nestle's new product line.

"Our 1998 tracking found that one in three consumers is buying convenience," says Joan Perrin, national producer liaison manager with the Beef Information Center (BIC) in Regina. "We also found that frozen, fully prepared meals increased in popularity from eight per cent to 15 per cent during the past year.

"Nestle, working closely with BIC, therefore developed Thai and Szechwan beef stir-fry kits for the frozen food case. Containing a package of frozen sirloin strips, along with vegetables, sauce and pasta or rice, there is everything needed to cook a restaurant-quality meal in 10 minutes."

The beef is tenderized, seasoned and technology is used to retain its bright red color. It is lean and bright red in response to customer preferences.

"It's a convenience meal but it also allows the meal preparer to do some cooking, but not a lot of

cooking, and that's what Canadian consumers have said they want in convenience," says Perrin.

"The stir-fry kits offer a taste of international cuisine, as well as convenience and a healthy meal. The stir kits are in their fourth production run since being introduced last March, which shows they increase the sales of sirloin. It also shows that this is what consumers are looking for "a branded product they know will be consistent every time," says Perrin.

Source: Saskatchewan Agriculture and Food, "Stepping up to the Plate," *Farm & Food Report*, November 23, 1998.

(Editor's Note: These new Nestle products require consistent beef cuts to allow them to make a consistent consumer ready product. One of the ways they can improve their chance of producing a consistent product is by cutting the beef into strips and tenderizing it. This would improve the homogeneity since the strips could be a mixture from a number of carcasses and the tenderizing process can be applied more intensely to carcasses which are less tender.)

- make the production of the raw materials from living organisms as consistent as possible by using a fixed or very narrow genetic base to produce the plants or animals that are generating the raw material in question (e.g., cloning of fruit trees, producing broiler chickens from specific genetic lines);
- store a wide range of a given raw material for a long time so that batches or 'lots' of consistent quality can be made up when orders are received which specify the range of quality attributes that would be acceptable (e.g., blending warehouses for wine and whiskey);
- find ways to effectively, cheaply, and quickly identify the properties of individual units of raw material so users can select the units they want to group together to give them a homogeneous lot for their use (e.g., farm purchases of wheat for export in Canada); and
- blend a small amount of the heterogeneous raw material with a large amount of a homogeneous material (e.g., "blending off" a small truck load of high moisture wheat into a railcar of dry wheat).

XI. Increasing the Consistency of Beef

Physical Manipulation

When we look at the previous section on techniques to increase consistency, we can see that some of the methods used by other commodities to produce a homogenous product can also be used by the beef industry. Historically the main approach taken by the beef industry to produce a more homogeneous product was to cut beef into tiny pieces, blend the pieces together and reconstitute and/or reshape these pieces into a product of constant size, shape, taste and texture. The outstanding example of this is the beef hamburger; other examples of this include sausage, wieners, luncheon meats and bologna. In addition to these traditional techniques,

processors are now looking at new ways to produce a more physically consistent product by injecting solutions, using tumbling devices and/or restructuring muscles and pieces using binding agents.

Refine Grading Methods and Grading Grids

The second major method used to improve consistency is to give beef carcasses a grade just after slaughter. This grade allows carcasses with broadly similar traits to be put in groups or lots so that it is easier for the processor or ultimate consumer to get a consistent product. Unfortunately the existing grading systems rely on measures that can be taken quickly and at low cost so that the final product does not have to bear a significant increase in cost because of grading. Traditional grading measures have included things like the age of the animal, the external fat on the carcass, and the internal fat marbling within the carcass. These measures are fast and cheap to make but do not always reflect the ultimate eating satisfaction that a consumer enjoys. They are a trade off between what is possible and what the majority of industry players feel they can afford.

It should be noted that some players in the beef industry have recognized the shortcomings of the present grading system and are now actively developing systems that will give them a cheap way to more accurately and more quickly assess beef quality. Some of these developments have been summarized in the article "Making the Grade" by Steve Kay in the June, 1997 issue of *Meat & Poultry*. Mr. Kay points out that Excel and Monfort are testing video-imaging analysis (VIA) systems in the USA. Excel plans to introduce VIA into its five fed-cattle plants by the end of the year, while sister plant Cargill Foods in High River, Alberta, is already using VIA. Two Cargill plants will start testing a tenderness system that uses a shear force testing system.

The VIA uses two cameras; one photographs the whole carcass and the other photographs the rib-eye. The system then calculates red meat yield, marbling, color of fat and muscle, firmness and percentage of intra-muscular fat. The grader

(i.e., a human) will be present as a backup, to act as an independent auditor. The system's biggest advantages would be its accuracy, objectivity and speed with which it collects carcass information.

Several systems for measuring meat tenderness are also in the development stage. One system involves the removal of a one-inch thick rib-eye from between the 12th and 13th rib. The meat is then cooked for six minutes and shear tested for tenderness. It is reported that the whole procedure takes 10 to 15 minutes; this is said to be the same or less time it takes to quality grade a carcass in the conventional way. The cost of a fully automated system is estimated to be US\$200,000 for a 3,000 head per day plant. This would be roughly \$4.32 per carcass (\$0.01 per pound for all steaks or roasts and \$0.07 per pound for the ribeye roll and strip loin).

Mr. Kay reports that a second tenderness system that uses ultrasound has been developed at the University of Denver Research Institute. Results so far look promising since the ultrasound measurements have shown a high correlation with those produced using a shear testing system. A third system, the Canadian Swatland, is being developed in Canada. It uses a probe to measure the amount of connective tissue in the big rib-eye muscle and relates this measure to a tenderness score.

Branded Products

In the last twenty years new systems for coping with the inherent heterogeneity of the North American beef herd have emerged. These systems combine the principle of making the initial raw material as consistent as possible through genetics with the principle of making the technical transformation process as consistent as possible. Here is a brief listing of this newest thrust to improve beef homogeneity:

1. In the U.S.A.:

- Certified Angus Beef (CAB) program
- Monford Integrated Genetics
- Beef Works (by Excel)
- Farmland Genetics
- Certified Hereford Beef
- Precision Beef Alliance.

2. In the UK:

- Industry and Government specified a 'blueprint' of best practices needed to produce consistent beef. Since its publication, retailers have put pressure on producers to adopt these best practices.

3. In Australia:

- A "Meat Standards Australia" has been created. It sets standards that must be met by producers and processors before beef will be sold into specific market channels.

4. In New Zealand:

- A "Quality Mark" system is being implemented. In this system meat auditors check if processing plants are following recommended practices regarding such things as carcass handling, chilling, and ultimate pH. They use a system called accelerated conditioning and aging and the tenderness of the final meat cuts are measured by cooking and using a mechanical shear test.

The above mentioned are examples of the beef industry's move toward "branded" products. In the American examples, this branding (e.g., Certified Angus Beef) is concerned with differentiating beef sourced through a particular supply chain from beef that is not sourced through the supply chain in question. In the case from the UK, it is to insure safety.

Formula Pricing

This method really overlaps with grading and more consistent production methods. It represents a combination of a "grading grid" set up by a packer, combined with longer-term contracts between the packer, feeders and/or cow/calf producers. Some in the industry have termed this "Value-Based Marketing" (VBM). Campbell (1998) has recently described an example of one such arrangement between a large cow/calf operator, a feedlot and the Cargill Foods packing plant at High River, Alberta. Under this arrangement, carcasses are marketed and graded without a set price⁵. Premiums and discounts are added

or subtracted from this base price for each grade level.

Requirements for cow/calf producers entering the VBM program at the feedlot level are minimal. Each producer must provide a minimum of 50 uniform steers or heifers. However, Western Feedlots prefers 250 uniform animals to fill one pen. The minimum acceptable weight is 600 pounds. If the cow/calf producer sells his calves to the feedlot, the producer pays \$1.00/cwt on each animal going into the feedlot as a registration fee. If the cow/calf producer retains ownership of his cattle while they are in the feedlot, he does not have to pay a registration fee. Regardless of the financial return on his calves, the producer receives data on his cattle's carcass performance. He also receives summary data on the provincial averages for the same week his cattle are slaughtered.

The intent of the program is to guide producers to produce cattle that fit into the quality-type cuts that retailers can sell. However, at this time it is still too early to say whether or not the ultimate benefits justify the extra costs throughout the supply chain.

Does Branding Make Sense?

The process of branding or product differentiation, by its very nature, requires additional costs over and above the costs that would be incurred if no product differentiation took place. In the case of beef, such additional costs include everything from higher priced breeding animals to special penning and feeding regimes to separate killing, chilling and packaging systems. At the very least, there must also be additional market promotion costs since, if no market promotion is done, how will end users know that the branded product is any different from the unbranded one?

For a product differentiation strategy to be effective and sustainable, the selling price of the final branded products must be greater than the total costs incurred to differentiate the product. Clearly such a strategy can be very effectively carried out by industries that are dominated by a few companies (i.e., oligopolies) and more so if these industries carry out most of the processing steps themselves or can control the output of intermediate step processors. The ability of producers or sellers of beef to extract more money from the ultimate consumers of beef by product differentiation, and subsequent premium pricing, depends on their ability to effectively differentiate their product and to create a favorable "image" with consumers.

(Text continues page on 45)

Example of a Branded/Vertically Integrated System

The beef division of the Harris Ranch in Paso Robles, California decided that they could improve the financial situation of their company by setting out to produce a high-quality branded beef products for consumers and to reward those responsible for adding value to the cattle. To do this, they recruited progressive cow-calf producers to assist in developing a program called Partnership for Quality to link cow-calf producers with the Harris Ranch feeding and packing company.

Not only does the Harris Ranch give carcass information to participating producers, it also assists participating partnering producers in bull selection, financing, providing information resources and analyzing herd data. Harris Ranch then pays a premium for calves produced within the program guidelines as well as quality and yield-grade premiums based on carcass performance. The Partnership for Quality program stresses a three-tiered approach to genetic selection. Bulls used to sire calves in the program must have estimated progeny differences above established minimums for maternal traits, growth performance and carcass traits. When cattle are delivered to the feedlot, producers will receive a “genetic premium” of one dollar per hundredweight for progeny bulls meeting the Harris Ranch criteria. Producers can receive additional premiums

up-front when they sell their calves. These include a weaning premium, a vaccination premium and a seasonality premium for calves delivered between November 1st and April 1st. The producer can sell calves to the Harris feedlot, partner in ownership or retain full ownership. Producers that sell their calves to the feedlot still receive 25 percent of any carcass premiums earned as well as full carcass information.

A spokesperson for the company points out that consumers have said repeatedly that they want quality and consistency in their beef; however, the industry still produces and sell beef “on pounds.” Receiving feedback information is important to cow-calf producers because it allows producers to evaluate if a “branded” program makes sense to them. If they end up producing a calf that weighs a lot less, the quality premium must be high enough to more than compensate for the smaller animal or else producers will have no incentive to continue with the program.

(Editor’s Note: A vertically integrated contracting system like this one may be the forerunner of the future, but it is still too early to tell if the consumers will be willing to pay a high enough premium to give all the segments of the supply chain an incentive to produce a high quality, consistent product.)

The Certified Angus Beef Program in the USA

The Certified Angus Beef (CAB) program has been in existence in the United States since 1978. To date, it is a non-profit organization. The program itself does not own the carcass but they license the feedlots, packers, retailers, and restaurants to use the label "Certified Angus Beef." The program is presently working at the genetic level to increase the performance of Angus bulls.

Cattle that qualify for the CAB program can only be selected and processed at packing plants that are approved by the American Angus Association and monitored by the USDA. The initial criteria selects only those animals in which at least 51 percent of the hair coat is black. USDA graders then evaluate the selected carcasses and certify those that meet the CAB carcass requirements. These requirements are as follows:

- exhibit an average Choice or higher marbling degree (Modest or higher);
- exhibit "A" Grade maturity (9 to 30 months);
- be Yield Grade 3 or leaner (the full range of USDA Yield Grade 3 is accepted);
- exhibit medium to fine marbling texture;
- have beef muscling characteristics of moderately thick or thicker (this requirement eliminates all thinly muscled, narrow carcasses);
- may not have a hump on the neck exceeding two inches in height (eliminates bulls and cattle with significant Brahman influence);
- have no evidence in the rib eye muscle of internal hemorrhages (these small blood spots detract from the product's appearance); and
- be free of dark cutting characteristics.

The program organizers feel the market share of beef in the total North American meat market is

decreasing due to the abundance and reasonable prices of pre-cooked and ready-to-heat foods made from non-beef meats. However, the market for CAB is increasing and during their 1994 fiscal year more than 174 million pounds of CAB products were marketed by CAB licensees to consumers throughout the USA and in 18 other countries. This has grown to 480 million pounds by 1998.

The CAB program makes its revenue is at the packer level. Packers pay an independent USDA inspector to inspect the carcass and, because of the added value that the breed has, the packer will pay 1¢ to 8¢/pound to the program. Although figures were not available from packers participating in the CAB program, it is doubtful that a packer is able to sell a CAB carcass for more than 5-10 percent above a non-CAB carcass. The biggest long-run benefits to packers may come in the form of increasingly large orders for CAB products and hence the biggest benefits may come in the form of volume related efficiencies and increased market share.

Producers grow the cattle with the goal of the carcass being certified, and for this they will get a premium that is defined by a grid system at the packer level. Besides meeting certain quality minimums at the carcass level, the carcass must come from an animal that is at least 51 percent Angus. On a national average, only 18 percent of Angus and Angus-type cattle that meet the program's live animal specifications actually qualify for the rigid carcass specifications that allow them to be ultimately marketed as CAB products.

The program is popular with consumers because of the demand for high quality beef with marbling. One of the problems presently facing the program is that demand is increasing faster than they can arrange for increases in supply.

(Editor's Note: This program is probably the branded beef program that has achieved the greatest market penetration. It stresses consistency, not only at the farm level but also at the carcass and processor levels.)

The Emergence of a Canadian Angus Beef Program

The certification program for Canadian Certified Angus Beef (CCAB) has only been in existence for about six years. The program in Canada is still very young and still small but it plans to use the American Angus Association's blueprint for a Certified Angus Program (CAB) to make a similar type of program in Canada.

This Canadian breed-specific branding program has hide and carcass grading criteria. The live animal specifications are broad at this time, with the only stipulation being that there must be some Angus genetics in the animal, but they are phasing in ear tagging for half to full breed Angus animals so as to add validity to the program's end product. At present there are only four packers in Canada licensed to slaughter for the program.

In the United States, CAB cattle producers are paid a premium but in Canada, at the present time, the program only has a direct impact at the packer level because the Canadian program only considers the carcass of the animal when deciding if the animal will be accepted in the program. Thus the only advantage for the Canadian cattle producer to aim towards the program standards is that they may get a higher price from the feedlot or packer when selling their animals because they are Angus.

The program partly utilizes the present Canadian Grading system in that carcasses must meet the criteria for AAA or APR but the organizers feel that the present grading system cannot produce enough consistency. Thus they have introduced several other criteria that must be met

before the carcass will be stamped as CCAB. Thus a CCAB carcass must:

- Grade AAA or APR;
- Have a carcass weight that falls between 550 and 750 lbs.; and
- Meet the program's marbling standards.

The Canadian program aims its end products at niche markets, such as high-end restaurants that offer a high quality eating experience, and high-end retailers and butchers that are willing to pay more for high quality, consistent beef. The majority of the carcasses certified by the program are consumed in Canada.

The organizers feel that there is a growing demand for their product from consumers because of the growing demand for high quality, consistent beef products. Some of the benefits of the program's product are:

- The product is from a smaller animal and therefore the portions are reasonably sized; and
- The product is better marbled than the average beef product.

(Editor's Note: The organizers feel that the present Canadian grading system cannot provide the consistency and quality of cuts that some consumers are willing to pay for; hence an opportunity for a program such as theirs to develop a profitable niche market.)

XII. Should most Prairie Beef be Branded and/or Produced under Vertically Integrated Conditions?

Branded beef and/or a refined grading system would allow consumers to obtain more consistent beef cuts and hence help secure its market. One way to consider the potential demand for highly consistent (i.e. branded or precisely graded) beef cuts is to think of it as representing the summation of each beef buyer's willingness to purchase beef cuts. These may range from individuals and families to buyers that represent hotels, restaurants, and institutions. These groups can be divided into further subgroups by using criteria like income, family size, whether the hotel is a franchise or not, the cooking skill level of the people who would cook the beef cuts and so on.

The demand that each of these potential beef buyers exhibits will be a function of their tastes and preferences, their circumstances and the resources under their control. Each of these potential buyers has the possibility of being disappointed when they purchase a piece of beef. They, for instance, may buy a T-bone steak graded from AAA beef and be disappointed that it is not as tender as the one they purchased last week. No one likes to be disappointed, so we assume that the way we purchase beef is likely

influenced by our wish to avoid disappointment.

When we buy a 'brand name' food product we are using the brand name to minimize the disappointment we might experience. For example, we may buy Heinz ketchup for a premium price, not because it is the best tasting, but rather because we know with confidence, how it will taste and perform when we consume it.

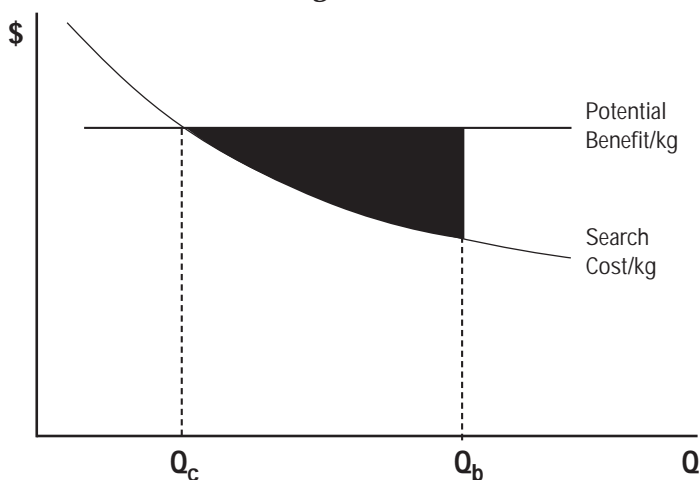
Of the major meat sources in North America, beef is the most heterogeneous and hence has the greatest chance to produce the greatest inconsistency (i.e. disappointment).

One solution to the problem of heterogeneity in beef would be to devise a more elaborate grading system and/or to have producers, packers and retailers do more testing and grouping of similar lots of animals and meat (e.g. contracting, branding, vertical integration, more detailed grading). However, we need to ask ourselves if the benefits of such a move are likely to exceed the costs. Are there some niche markets for beef that would benefit more than other niche markets?

Suppose a consumer has a choice between normal beef and "special grade" beef. A rational consumer would only purchase special graded beef if the perceived benefit would more than compensate for the increased cost. On the other hand, producers, processors and retailers would only produce special grade beef if the additional costs were more than compensated by a higher selling price. The cost of special grading will have associated with it, both a fixed cost and a variable cost. The ratio of fixed to variable will depend on the technology that is employed (e.g., hand grading each cut would have low fixed but high variable costs; grading with a MRI machine would have high fixed but low variable costs). Thus the technology employed and the volume of special grade beef sold will have an interactive effect on the cost of grading a unit of special grade beef.

As the production and consumption of beef products becomes more industrialized the demand for consistency increases. This would seem to imply that the price of beef could rise significantly if the consistency could just be improved. This is true, to a point, but it must be

Figure 7.1 The Trade-off Between the Benefits and Costs of Searching



tempered with several sobering thoughts. One of these is that the consistency of pork and chicken has already greatly improved and will continue to improve. Improving the consistency of beef may be necessary just to keep up with chicken and pork.

The second sobering thought is that as consumers buy more meals prepared outside the home, either in the form of restaurant meals or prepackaged frozen full meals, the number of actual buyers of beef is decreasing. For instance, where there may have formally been a buyer of beef from each “Mom and Pop” burger joint or greasy spoon restaurant, now there are only a few buyers who do centralized buying for a whole chain of franchised restaurants like McDonalds, Wendy’s, etc. These buyers are buying large quantities of beef at one time and they know what they want. They can afford to search a long time to find a packer or processor who can give them what they want at the price they want.

We have illustrated this point with Figure 7.1. The cost of searching is usually a combination of initial high fixed cost (e.g., a salary and car) and relatively small variable costs (e.g., phone calls, mileage allowance), resulting in a downward sloping “Search Cost/kg” curve. The “Potential Benefit/kg” curve is a horizontal (or possibly upward sloping line) because the potential benefit is a constant over all units purchased (it would be upward sloping if the price would drop for “volume discounts”). For each item being searched, there is some critical quantity and price of purchase necessary before it pays to carry out a search. In the Figure 7.1 this is shown by Q_c . The total net benefit one can obtain by searching is indicated by the shaded area to the right of the intersection of the Potential Benefit Curve and the Search Cost Curve. If we do not have a price/quantity combination that puts us in the shaded area, there is no benefit to searching.

Thus if one is buying a chocolate bar, one does not search as much as if one is buying a steak because the unit value of the chocolate bar is much less than that of a steak. Similarly if one is buying 20 steaks, one will spend more time searching for “a good deal” than if one is buying only one steak.

Now consider the big beef buyers for groups like franchise restaurants, retail chains and prepackaged food companies. They will be making very large purchases and hence are far to the right of Q_c on the horizontal axis of our graph (for example, at Q_b). This means that they can search for a long time and still be much better off, even if they only save a few pennies per kilo. This is a powerful phenomena that gives considerable market power to these “industrial size buyers” and drives suppliers to be very price competitive when selling to such large buyers. These buyers would love to buy beef from a packer or a supply chain system that can give them a more consistent product, and these big buyers can afford to literally scour the North American continent and even the world (if import regulations and transportation costs permit) to procure such a product. Thus the supplier of a consistent beef product can expect to get a premium relative to inconsistent beef products but this premium could be small if the big industrial scale users are being targeted. No doubt, somewhat larger premiums could be charged to small users since it does not pay for such small users to spend much time searching for “a better deal”. However, the volumes sold to many small users could be much less than the amount sold to one large industrial user.

This brings us back to the question: Should most prairie beef be branded or produced under vertically integrated conditions? The answer is both yes and no! No, if the beef grading system makes appropriate changes and all actors in the beef chain carry out cost-effective activities that will lead to more consistent beef products. Yes, if the beef market becomes more segmented and there is no way for an improved grading system to effectively provide beef for the more discriminating market segments.

XIII. Summary and Conclusions

The Canadian beef industry is facing interesting times. It faces the challenge of competition from alternative protein sources, land use issues, processor and buyer concentration and changing export demand. Thrown in with this mix is the threat of an erosion in quality beef eating experiences. The industry is getting used to hearing that one in four steaks coming out of the current Canadian grading system is judged by consumers to be unacceptable.⁶ This is a major problem, but it is not unique to Canada. In the United States, organizations like Certified Angus Beef are prospering by designing entire supply chains to create a more tender, consistent steak for the consumer. In Australia, Meat Standards Australia has set up separate supply routes for different markets of varying qualities to improve their domestic supplies and to combat a loss in their Asian market share as better quality exports from North America enter the Asian market.

The beef industry in Saskatchewan is a major sub-component of the agriculture sector. When we look at the future of beef production in the province, we must ask ourselves whether or not our packing, feeding and ranching industries will be able to cope with changes in the market for beef? Are our institutions prepared for the changing market forces? Are producers getting the right signals to change breeding, feeding and handling systems?

Summary

■ The three most popular meats in the world are beef, poultry and pork. Of these three, beef is, by far, the most variable and inconsistent because the range of genetic types, the methods of feeding and management, and the methods of cutting up the carcass are far greater for beef than for poultry or pork.

■ In North America, the greatest volume of beef is consumed in ground form in such products as hamburgers, tacos, chili, lasagna and sausage. The meat to produce this ground beef comes from the trim off of the most expensive beef cuts, the lowest priced cuts of the carcass, cow and

bull carcasses from North America and assorted cattle carcasses from overseas. Up to 50% of the weight of the average North American beef carcass is turned into ground beef but this contributes only about 30% of the value of the carcass.

■ In North America, the greatest value of beef is produced from the loin and rib portion of the carcass in the form of steaks. Many of these steaks are grilled and commercial buyers of raw steak want beef that has a moderate or high degree of fat marbling (i.e., intra-muscular fat) because of the high correlation between marbling and tenderness and taste. The beef to produce these steaks comes from North American cattle that have been fed high-energy grain rations for three or more months before being slaughtered. High value grilling steaks⁷ make up only about 11% of the weight of the average North American beef carcass, but this contributes 28% or more of the value of the carcass. (In the summer when the price premium for grilling steaks is at its yearly high, grilling steaks would contribute even more than 28% to the value of a carcass.)

■ The definition of beef quality varies with the end use. Buyers of steak say that taste and tenderness are the most important ways to judge the quality of a steak, however, these traits are difficult and/or expensive to measure before the steak is actually eaten.

■ Marbling is highly correlated with taste and tenderness so there is a great deal of emphasis on marbling as a measure of the overall value of a beef carcass. Many buyers feel marbling improves the quality of a steak but it can detract from the quality of other cuts of beef where intra-muscular fat is a detrimental factor.

■ Calves produced in Saskatchewan come mainly from two types of producers. The first consists of mixed grain and cattle farmers who have 100 or less cattle who use them as a way to turn poorer quality land and surplus winter labor into a source of cash income. These producers generally try to minimize the cash costs of

production and hence have relatively little investment in feeding facilities and breeding stock and generally have little capacity or motivation to produce beef cattle that are highly consistent in size, age, breed and sex.

■ The second group of cattle producers are often referred to as ranchers and have 100 or more cattle. The majority of their income generally comes from cattle and they often invest considerable cash in their breeding herds and in setting up facilities that make it easier to feed and look after their cattle. These producers often have the capacity and motivation to produce groups of beef cattle that are relatively consistent in size, age, breed and sex.

■ These two types of beef producers are likely to remain in Saskatchewan for a long time to come. This mixture of producers means that Saskatchewan will continue to be a producer of a wide range of cattle for slaughter and hence that there will be a wide range of types and kinds of beef produced.

■ Commodity grading systems are meant to help buyers and sellers group together individual units of the commodity into batches or lots that will improve their value in the market place. To be effective, the grading criteria and the attribute range within each grade must be periodically reviewed and updated as technology and the needs of an industry change.

■ Although there are 21 different grade combinations in the Canadian beef grading system, the majority (85%) of carcasses from western Canada fell into five grade combinations in 1997. These were: AA1 (37%), AAA1 (14%), A1 (13%), AA2 (11%) and AAA2 (10%). Carcasses in the “A” grades are normally destined to be cut up into steaks and other cuts that will be sold to retail chains or the hotel, restaurant and institutional (HRI) trade.

■ Buyers for retail chains and the HRI trade often buy only one grade of beef (e.g., AAA) but complain that there is too much variation in the

size, tenderness and taste of the beef cuts, even though they are buying a single grade. This is because the existing grading system fails to identify carcasses that will give a consistent beef eating experience.

■ The North American market for mid-range cuts (e.g., roasts, brisket, flank) of beef is generally stagnating or even declining because traditional methods to cook these cuts are more time consuming than steak-like cuts or ground beef products. For more and more North American consumers and restaurant operators, “time is money” and meat products which require long preparation times are becoming less and less attractive.

■ More and more beef is being prepared and/or eaten outside the home in such forms as fast food meals, restaurant meals and prepackaged ready-to-cook meals. This trend has increased the demand for industrializing and systemizing the procurement, processing, preparation and serving of beef products. In this process, increasingly sophisticated processing machines are being coupled with relatively low skilled labor and more consistent raw beef to produce beef eating experiences that consumers can count on.

■ The trend toward industrial scale production of beef oriented meals has greatly increased the demand for consistent beef cuts, even though the overall quality of the beef cuts may go down. It is now quite possible to find cases where large, consistent batches of mid-quality beef will bring a higher total value to a packer than a similar sized batch of meat that contains a mixture of high and low quality cuts. This is because the consistent batch requires only one adjustment of machines and labor to be processed whereas as the inconsistent lot may require many adjustments. Each adjustment has associated with it, physical costs and lost production in the form of “down time.” With more and more meals being prepared outside the home, consistency of cuts is becoming one of the most important criteria in deciding which type of meat to process, prepare and promote.

■ Ground beef is beef that is ground into small pieces and mixed into consistent lots. The physical grinding makes it tender and the mixing makes it consistent. It is, by far, the most consistent, large scale, beef product. Buyers of ground beef do not complain about its consistency or quality and it has become extremely popular. However, recent concerns about the saturated fat content in ground beef are now having a negative impact on this product grouping.

■ On the other hand, consumers often complain that steak, even from the same grade, is inconsistent in taste and tenderness. The imperfect measurements of tenderness and the failure to address carcass size in the current grading system, combined with the wide range of post-grading treatment and handling of steak-like cuts, often give consumers an inconsistent eating experience.

■ In an attempt to capture market share from conventionally sourced steak and from high-end pork and poultry meals, some companies and cattle associations have instituted a system of branding and/or vertical integration.

■ Such systems try to improve the consistency of the final beef eating experience by limiting the range of genetics, feeding systems, selling weights, slaughter techniques, aging times, cutting methods and cooking procedures.

■ It is too early to say, with certainty, if consumers will ultimately be willing to pay for the extra costs involved when these type of systems are used to produce a more consistent beef eating experience. An improved grading system coupled with clear cooking instructions attached to the retail package may give a more consistent beef eating experience at lower cost to consumers.

Conclusions

Unless things change, it is likely that, in the future, Saskatchewan will continue to produce a wide range of beef cattle and, therefore, relative-

ly inconsistent beef. This is not what the North American market wants.

The Saskatchewan beef industry can improve its chances of long term viability by carrying out activities which will lead to less consumer disappointment with their beef-eating experiences. Such activities should include at least the following:

1. *Improve the grading system and signals to producers by:*

- Assisting investigations that look at how to quickly and cheaply assess the taste and tenderness of the higher priced cuts of beef at the packer level;

- Examining ways to improve the existing beef grading system, and especially the “A” grades, so that buyers receive a more consistent product when specifying a particular grade combination;
- and

- Helping potential new and existing processors of processed beef products overcome the relatively high cost of having a federally inspected meat processing plant (i.e., Saskatchewan has a very small population so most beef products must be exported; exports of beef products are not permitted unless they come from federally inspected plants).

2. *Develop more consistent production and processing practices by:*

- Investigating the feasibility of joining or forming a beef program that stresses the production of consistent beef;

- Examining ways for smaller cow/calf producers to jointly produce cattle in larger, more consistent lots (e.g., agreeing to use the same breeds or breeding systems, selling in a narrower weight range); and

- Carrying out research into the technical and economic benefits and costs of alternative cattle production systems that look at the possibility of producing grass fed beef with no marbling, non-traditional times of calving and marketing, etc.

3. Encourage the development of products which improve the consistency of beef by:

- Developing new products that rely on things like marinates, physical cutting, tumbling and restructuring to produce more consumer ready-to-eat products, particularly those that can be made from the mid-priced cuts that are experiencing a market decline, to produce dishes that are ready to heat and eat (e.g., beef cubes made into curry, Tex-Mex dishes, marinated Filipino dishes, etc.).

XIV. Problems and Opportunities for Further Study

When this study was being carried out, it became obvious that there was a lack of resources to investigate many facets of the beef market and the beef industry. Many issues were raised by the various people interviewed and by other studies. Below is a compilation, in no particular order of importance, of some of the problems and opportunities that could warrant further study and investigation in an effort to enhance the value-adding potential of the Saskatchewan beef industry.

If all beef on the prairies were purchased through branding or vertically integrated systems, packers and retailers would potentially have even more market power than they now have. What pricing mechanisms would have to be in place to ensure that all actors in the beef supply chain were receiving a fair price for the goods or services they supply or render?

The single most important factor determining the pleasure of a beef eating experience is the way the beef is cooked. Would the beef industry be justified in spending money on TV and magazine advertising that stresses how different cuts of beef should be cooked?

To our knowledge, there has never been a successfully run beef slaughter and/or processing plant run as a cooperative in North America. Why? Does this imply that proposed “new generation coop” beef and buffalo slaughter plants are likely to fail?

What makes consumers in Quebec more accepting of processed beef products and can such acceptance be transferred to consumers in other parts of North America?

Relative to the poultry, dairy and hog industries, the cattle and beef industry in North America has been difficult to organize and to change. Part of this can be blamed on the strong individualism that is common in the cattle and beef industries. It can also partly be blamed on the fact that the number of cattle and beef producers is far greater than the number of poultry, dairy or hog producers and hence, that it is more expensive to organize them. Are there other reasons? What things can be done to build more cohesive groups of like-minded cattle and beef producers?

What are the quantity and quality parameters that define the main markets for beef in North America and what are the associated demand elasticities?

Why can't the beef industry agree on what consumers really want in their beef and why can't we use genetic means to quickly get this type of beef?

In Saskatchewan, we will likely continue to have a large number of smaller cow/calf producers. Many of these producers are too small to incorporate new techniques that will lead to more consistent beef. Would they be financially better off producing beef for less discriminating grinding and processing markets or by turning their animals into products that can be made consistent on their farms (e.g. beef sausage, beef jerky)?

Are there ways to reduce the cost of meat inspection services for farmer processed beef so that the health status of the meat is still assured but the cost to the farmer/processor is reduced so that it becomes financially more viable to add more value to the meat on the farm itself?

XV. References

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Endnotes

- 1 The survey was carried out by the Lacombe Research Center in 1996 and the results, at the 95% confidence level, were reported on the Center's web site in 1997.
- 2 Although the table combines numbers from Saskatchewan and Manitoba (i.e., SK/MN), the majority of animals come from Saskatchewan.
- 3 Some producers may get a small premium for their animals if they have a reputation for a high percentage of AAA grades, but the price does not vary directly with the percentage of AAA in any given lot of cattle.
- 4 This is assuming that the final ration would be about 80-90% barley at C\$2.50 per bushel (i.e., C\$0.05 per pound) and that eight to ten pounds of this ration would be required to put on one pound of fat.
- 5 The base price is the average price of the previous week's live slaughter cattle. This is worked back to the base rail price when divided by the average dressing percentage of the previous week. The premium is paid by Cargill to Western Feedlots which then pays the cow/calf producer his percentage of the premium based on the weight of the calf on entering the feedlot as a portion of the final live weight of the animal before slaughter.
- 6 Some studies suggest as many as one in three are unacceptable.
- 7 Grilling steaks exclude round and flank steak, which are good for simmering but not for grilling.

APPENDIX A

Some Thoughts on Avoiding Consumer Disappointment by Special Grading

Some consumers have experienced disappointment when they purchase raw beef for cooking. They complain that one piece of beef is not the same as the next, even though both pieces have the same grade. This implies that the ranges within the present grading system may be too broad and/or too imprecise. One possible solution might be to introduce a special grading system to generate a group of beef cuts that discriminating beef purchasers would find more appealing than what they can presently purchase. This Appendix presents a quick overview of some of the issues that would surround such a move. It presents a simple generalized model of a beef consumer, keeping in mind that such consumers could range from a single teenager to a procurement officer for a prison.

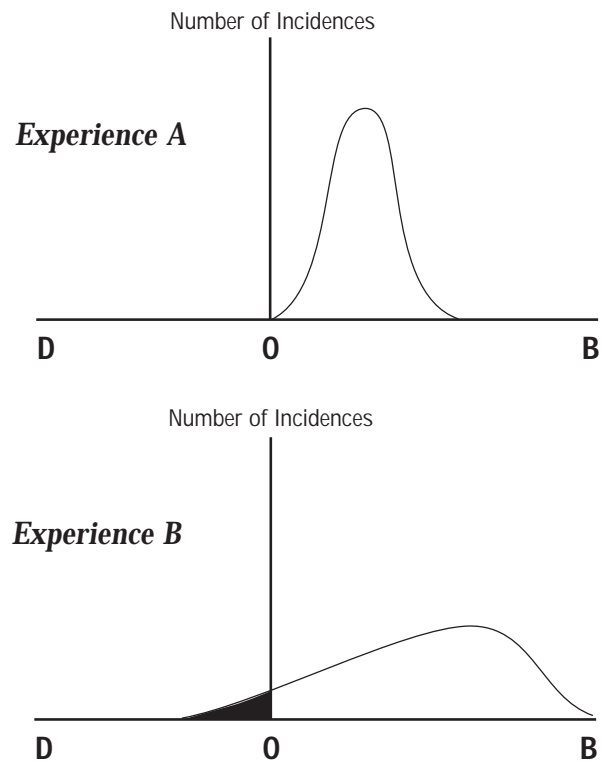
Consumers behavior is often more of a reaction to a negative experience (i.e., a disappointment) than it is to a positive one. Although the following example is certainly extreme, it does illustrate that the possibility of negative experience or disappointment can have a very strong influence on what a consumer decides to do. This is an important concept for the beef industry to remember as it fights for market share with poultry and pork.

To illustrate this point, consider the situation of consumers who like to eat mushrooms. (See Figure 8.1) Let Experience A represent eating domesticated mushrooms while Experience B represents eating mushrooms collected from the wild. On the horizontal axis let D represent disappointment and let B represent benefit or satisfaction. Domesticated mushrooms are consistently clean, have a reasonable taste and are always safe to eat. Wild mushrooms are often dusty or dirty and have a wide range of taste. A significant portion of wild mushrooms taste much better than

domesticated mushrooms, however, a small percentage of wild mushrooms are poisonous and can cause sever illness and/or death. The chance of disappointment (i.e. illness or death) is enough to convince most consumers to eat only domestic mushrooms even though it means forgoing the chance to have some really tasty (i.e., wild) mushrooms. Thus when we look at the market for wild mushrooms, we cannot directly compare them to domestic mushrooms even though both domestic and wild mushrooms belong to the generic food category called mushrooms.

Now consider the market for beef in North America. Disappointment does not have to be as

Figure A.1 The Benefits and Disappointments of Eating Domestic & Wild Mushrooms

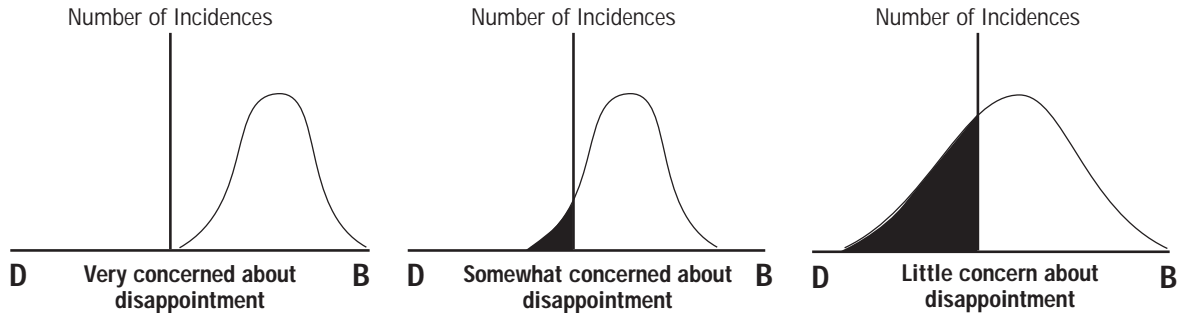


extreme as death. People often buy consistently bland food to avoid the chance of a disappointing eating experience even though they may be giving up the possibility of better tasting food. Grading, branding (i.e., quality assurance schemes) and vertical integration are all ways of addressing the issue of consistency (i.e., minimizing disappointment) to varying degrees. We could define the beef market in a non-tradi-

tional way. Instead of dividing it into the market for different cuts (e.g., the blade steak market or the hamburger market) we could divide the beef

market into users who can tolerate the different levels of disappointment. This could be done in the following way.

Figure A.2 Comparing Consumer Disappointment



“It better be good”

- Consumers who have little skill and/or time to cook difficult cuts of meat
- High end restaurants
- Franchises
- Bigger HRI establishments where no captive consumers
- Are often willing to make substitutes like using portion ready (i.e., expensive) meat so that preparation time or labor costs can be minimized
- Not price sensitive, per se, about the cost of a cut of beef but are often price sensitive about the cost of delivering a serving
- Can cope, at high cost by:
 - Losing customers
 - Hiring more trained chefs
 - Spending on advertising to convince consumers that they are getting their money's worth even though product is inconsistent
 - Throwing away product just before serving customers if it turns out bad
 - Cooking product in more complicated ways

“I’ll take some beef”

- Retail consumers who often have the skill and time to cope with difficult cuts of meat
- Smaller HRI consumers with only one or two cooks and/or one or two sites
- Meat processors (wieners)
- Moderately price sensitive
- Can cope, at moderate cost, by:
 - Altering planned processing and/or cooking techniques once raw product purchased
 - Blending several raw products together

“I want something cheap”

- Prisons, army, summer camps (captive consumers)
- Some institutions (cheap boarding houses and restaurants)
- Retail consumers who have the skill and time to cope with difficult cuts of meat
- Some processors who know how to alter processing recipes and/or who are very price sensitive
- Highly price sensitive
- Can cope, at low cost, by:
 - Forcing people to eat inconsistent beef
 - Cooking in a way that homogenizes end product (e.g. stew, beef hash)
 - Hiring extra people or buying devices (e.g. grinders, needle tenderizers) that will allow them to modify meat cheaply

Suppose a consumer has a choice between normal beef (N) and special graded beef (SG). A rational consumer would only purchase SG beef if the perceived benefit due to either increased quality or decreased chance of disappointment would more than compensate for the increased cost. On the other hand, producers, processors and retailers would only produce SG beef if the additional costs were more than compensated by a higher selling price. In other words, the production of special grade beef will only be sustainable if the consumer benefits of special grading are greater than the total costs incurred by grading and segregating the SG beef.

The cost of special grading will have associated with it, both a fixed cost C_f and a variable cost C_v . The ratio of C_f to C_v will depend on the technology that is employed (e.g. hand grading each cut would have low C_f but high C_v ; grading with an Image Analysis machine would have high C_f but low C_v). Thus the technology employed and the volume of SG beef sold will have a direct impact on the total cost. A manual special grading system would almost certainly have lower unit costs if only a small amount of beef were special graded, but at high volumes an automated special grading system would probably be more cost effective. Thus the total unit cost of producing SG beef will depend on the type, sophistication and cost of testing that is required divided by the total volume of SG beef that can be sold.

The ability to cover these costs will depend on the premium consumers are willing to pay for a particular type of SG beef and the volumes they will purchase at a particular premium price level. The benefits consumers get from beef consumption will be a function of its price relative to substitutes and compliments, the level of consumption and the frequency and degree of disappointment that is experienced when the beef cut is finally cooked and eaten.

It should be noted that the long term disappointment we associate with a particular good or service is a function of our cost of coping with the disappointment, the irreversibility of the disappointment, the number of disappointments in the past, our ability to avoid the disappoint-

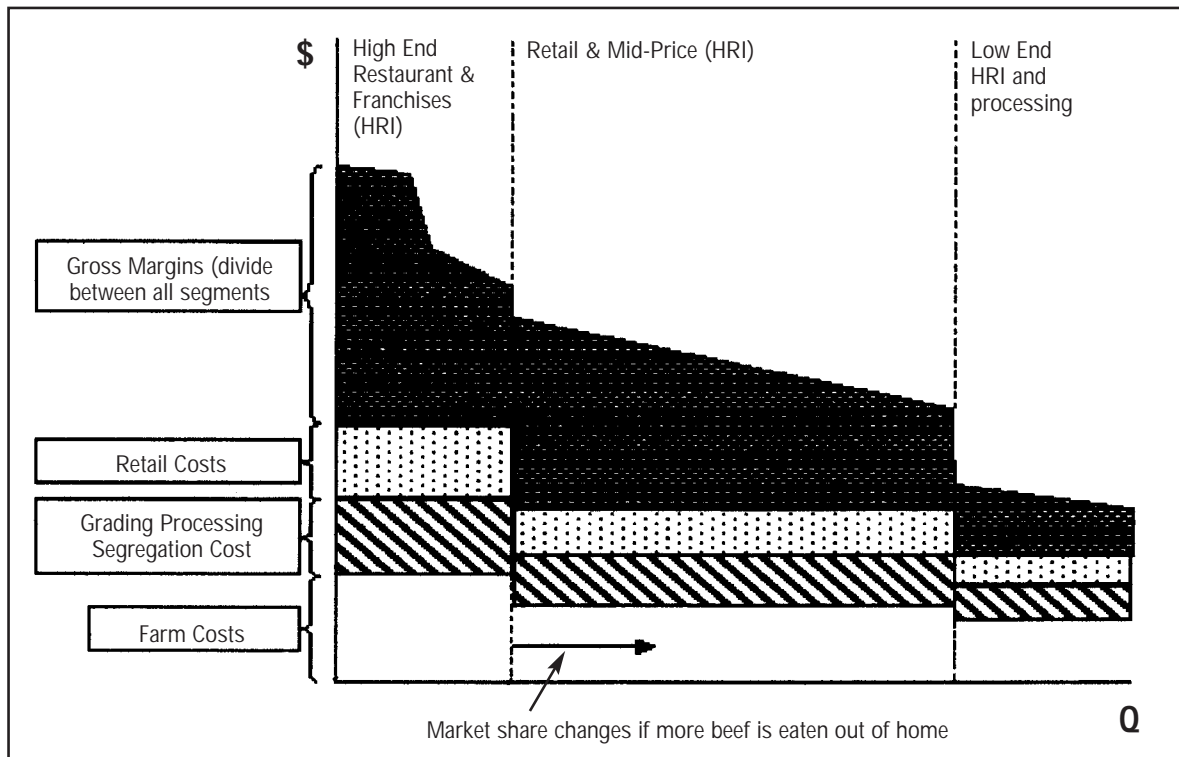
ment in the future and the quantity consumed of the disappointing good or service.

The chance of being disappointed is seldom taken into account in looking at the demand for a product, but if a given product is inconsistent in its quality attributes, this can have an important bearing on the popularity of that product. The price premium consumers might be willing to pay for SG beef is, in part, a function of their ability to cope with the disappointment of having a beef purchase that they are initially unhappy with. The more difficult it is for them to cope with the possible disappointment, the higher the premium they will pay, providing, of course, the premium does not become so high that they forgo beef and choose other meats instead. No one raves about how wonderful chicken fingers or nuggets taste, yet these items have become very popular meat items; not because they are so good but rather because they are never bad. In this regard, the beef industry could learn something from the poultry industry.

In economics, demand curves are generally drawn downward sloping to show that more units of the items in question will be purchased as the price of the item drops. In Figure A.3 we have tried to incorporate this idea along with the three types of market segments identified above (i.e., "It better be good," "I'll take some beef" and "I want something cheap"). We have also tried to use shading to indicate the relative costs that would be incurred by each of the main links in the marketing chain. Thus the shaded area showing grading, processing, segregation costs in the premium priced segment is larger than the shaded area showing those same cost items in the low price segment because more expensive, more precise grading and segregation in the premium priced segment would help ensure that, indeed, the price premiums were as high as possible. The gross margins per unit should be the highest in the premium priced market, but it is beyond the scope of this study to determine how these gross margins would be divided up between producers, processors, distributors and retailers.

In the context of the three types of consumers outlined above (i.e., "It better be good," "I'll take some beef" and "I want something cheap"), the

Figure A.3 Theoretical Demand, Supply and Total Margins in the Beef Market



“It better be good” consumers would pay the highest premiums and the “I want something cheap” group would pay the lowest premiums. The “It better be good” market segment would consist mostly of the higher end HRI trade and higher end HRI processors. Most of the beef cuts they would buy would be steaks and ribs. These users are the prime targets for privately operated branded beef programs and/or for beef from vertically integrated beef supply chains because the end users are willing and able to more than pay for the extra costs of special treatment, grading and segregation. This ability and willingness to pay extra for very consistent beef insures that end users in this market segment generally get what they want regardless of the type of public grading system that exists, although improved grading would make their job easier.

Large amounts of beef could be consumed by the “I want something cheap” market segment. This market segment is not willing to pay a high premium for SG beef but they could be a very good target market for beef products that have been homogenized. This market segment could

be a very good target market for beef processors who buy small lots of inconsistent cattle and/or who may produce beef animals finished in Saskatchewan in non-traditional ways (e.g., grass-fed young bulls).

At the present time, the biggest volume of beef is most likely consumed in the middle priced market segment (i.e., “I want some beef”). This market could probably be best served by an improved, publicly run, grading system since the cost of improved grading could be spread over a large number of carcasses and consumers in this market. Consumers would likely be willing to pay a small premium for more consistent beef cuts. This market segment is also the segment that would benefit the most from increased expenditures on having more cooking information distributed with packaged retail cuts and in the media.



striploin grilling steak

club pack™, aged 14 days, cut from Canada "AAA" beef  **6⁹⁸**

554360 15.39/kg /lb



striploin grilling steak

club pack™, aged 14 days, cut from Canada "AAA" beef  **6⁹⁸**

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