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April 27, 1990

EXPANDING BEEF EXPORTS TO JAPAN

Background, Opportunities, and Strategies

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A.E. Research Series, No. 90-3

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INTRODUCTION

Japan is the leading export market for U.S. beef and veal products importing about 203,483 metric tons valued at approximately 1.28 billion dollars in 1989.^{1/} The potential for exporting beef to Japan has received intensive interest since the signing of the 1988 Japanese Beef Market Access Agreement. Under the agreement, import quotas and the government's involvement in beef import will be replaced with higher tariffs and direct negotiations between Japanese importers and exporters starting in April 1991, promising easier access to the Japanese beef market. During the past decade, analysts in both private and public organizations have devoted substantial effort to studying the Japanese beef market. However, misconceptions of the market still exist. The main purposes of this paper are to improve our understanding of the Japanese beef market and to study the profitability of a proposed production/marketing strategy for expanding beef exports to Japan.

JAPANESE DIET

For hundreds of years, Japanese have lived on rice as a staple food and on vegetables, soybean products, and fish as subsidiary foods. Only a century ago was the eating of meat from four-legged animals legalized by the Emperor Meiji. Meat consumption increased after World War II when the Occupation Authorities brought bread with meat and other livestock products into the lives of ordinary Japanese. Associated with the changing life-styles and social mores and with economic prosperity, traditional Japanese diets have changed to include different forms of food and more protein from livestock and marine products (Table 1).

1. These figures are reported by the Japan Tariff Association. Due to different classifications of beef and offals and prices (*cif* or *fob*), official Japanese and U.S. trade statistics often do not agree.

Table 1. Annual Per Capita Consumption of Livestock Products and Fish, Japan

JFY	Beef	Pork	Chicken	Eggs	Dairy	Fish
-----Kilograms ^{1/} -----						
1960	1.2	1.3	0.4	4.9	22.3	28.1
1965	1.5	3.0	1.9	11.3	37.5	29.2
1970	2.1	5.3	3.7	14.5	50.1	31.6
1975	2.5	7.3	5.3	13.7	53.6	34.9
1980	3.5	9.6	7.7	14.3	65.3	34.8
1985	4.4	10.3	9.1	14.9	70.6	35.8
1988	5.4	11.4	10.5	16.4	80.9	37.0

Note: 1. Net edible weight.

Source: Ministry of Agriculture, Forestry, and Fisheries (MAFF), *Food Balance Sheet*, various issues.

Since the mid-1960s, meat consumption in Japan has nearly tripled. However, beef consumption has not risen as fast as that of other meats (Table 2), primarily because the domestic beef industry has expanded slowly and the government has tightly controlled beef imports. Even though Japanese meat consumption has registered substantial growth, Japanese consume much less meat and more fish than consumers in other industrialized countries (Table 3). The importance of fish consumption in Japanese diets relative to that in other industrialized countries is quite clear. Over time the Japanese diet has become more westernized, but it is doubtful that Japanese meat consumption will become similar to that of the U.S.

Table 2. Average Annual Percentage Change in the Consumption of Livestock Products and Fish, Japan

Item	1960-1965	1965-1970	1970-1975	1975-1980	1980-1985
-----Percentage-----					
Beef	4.6	7.0	3.6	7.0	4.7
Pork	18.2	12.1	6.6	5.6	1.4
Chicken	36.6	14.3	7.5	7.8	3.4
Eggs	18.2	5.1	-1.1	0.9	0.8
Dairy	11.0	6.0	1.4	4.0	1.6
Fish	0.8	1.6	2.0	-0.1	0.6

Note: Figures were derived from Table 1.

Table 3. Consumption of Meats and Fish
of Selected Countries, 1985

Country	Annual Per Capita Consumption	
	Meat	Fish
	----Kilograms----	
Canada	96.5	7.2
W. Germany	99.8	6.4
Japan	25.1	35.8
U.S.	117.5	7.1

Source: OECD, *Food Consumption Statistics*.

JAPANESE BEEF MARKET

Supply

Roughly 60 percent of the beef consumption in Japan is produced domestically and the remaining 40 percent supplied from overseas, mainly Australia and the U.S. The sources of beef supply in 1988 are summarized in Table 4. Beef produced in Japan comes from two major sources, Wagyu (indigenous beef cattle) and dairy (Holstein) steers. Wagyu beef accounts for nearly 30 percent of domestic production. The importance of dairy cattle in the domestic beef supply has gained increasing momentum since the early 1960s when dairy calves were utilized as feeder calves. A small portion of Japanese domestic beef production comes from Mury Grey and Angus steers imported as calves mainly from Australia and fed in Japan. In 1977 Japan imported 92,550 mt of beef of which 8,611 mt (9.3%) came from the U.S. and 77,835 mt (84.1%) came from Australia. Since 1977 the U.S. share of the Japanese imported beef market has increased steadily to 19.0% in 1980 and 32.3% in 1985 while the Australian share decreased to 75.7% and 61.0% in 1980 and 1985, respectively.

Table 4. Sources of Japanese Beef Supply, Primal Cut Weights, 1988

Sources	Metric Tons	Percentage
Domestic Wagyu	117,060	17.9
Domestic Dairy	269,607	41.3
Domestic Others	8,922	1.4
U.S.	105,584	16.2
Australia	134,147	20.6
Others	17,309	2.7
Total	652,629	100.0

Source: *Meat Statistics in Japan*, MAFF, February 1989.

Demand

We are told very frequently that beef in Japan is 7 to 10 times more expensive than beef in the U.S. and Australia. Indeed, one can easily find beef priced at \$40 to \$50 per pound in ordinary supermarkets and even up to \$100 per pound in many department stores. However, this comparison is unfair due to quality differences between various types of beef in Japan. The top quality Wagyu beef is the famed Kobe or Matsusaka beef. The most expensive Kobe beef is often sold for \$80 to \$100 per pound at the retail level. Second grade dairy beef, the most popular domestic beef which may correspond to U.S. Prime or high Choice grade, is priced around \$4 per pound, carcass weight, at wholesale markets. Thinly sliced square-cut chuck from these carcasses may sell for \$10 to \$13 per pound at ordinary supermarkets, compared to \$4 to \$5 for similar cuts from frozen U.S. grain-fed beef and \$3 to \$4 for Australian grass-fed beef. It is quite clear that beef in Japan is priced at a very wide range (Table 5). More importantly, the types of beef imported in the past were shown to be quite different from and hence not good substitutes for domestic beef (Mori, Lin, and Gorman, 1989).

Table 5. Wholesale Carcass Prices of Domestically Produced and Imported Beef, by Type of Animals and Grade, Tokyo, 1987.

Class	Supreme	Superior	1st	2nd	3rd	Utility	Average
	(U.S. \$/cwt.)						
Wagyu Female	1,054	827	695	589	468	305	608
Wagyu Steers	942	799	681	584	484	338	636
Dairy Female	-	-	547	422	326	223	324
Dairy Steers	-	-	510	400	358	248	379
Imported Longer, Grain-fed Beef ^{2/}			U.S. ^{1/} Prime	U.S. Choice	Australia		
			381	366	326		

Notes: 1. U.S. \$1.0 = 146 yen in 1987. 2. Prices of imported beef are for June to December.

Sources: For domestic beef, "Monthly Report of Meat Marketing Statistics for January 1988," MAFF. For imported beef, personal communications with H. Imamura of Tokyo Meat Wholesale Market Co., Ltd.

This wide range of beef prices represents the Japanese willingness to pay an incredibly high price premium for beef quality. Degree of marbling is one of the most important factors in the Japanese beef grading system, and higher degree of marbling can be achieved mainly through longer feeding practices for selected cattle. The typical feeding periods for beef sold in Japan are summarized in Table 6.

Table 6. Feeding Periods for Beef Sold in Japan

Cattle Type	Month on Feed
Wagyu-Supreme	30-36
Wagyu-1st and 2nd Grade	20-24
Dairy Steers	10-14
U.S. Choice	4-7
Australia Lot Fed	2-3

BEEF IMPORT REGULATIONS

Import quotas, tariffs, and involvement of the Livestock Industry Promotion Corporation are the main instruments for restricting beef imports into Japan. Beef imports are subject to an ad valorem (levy on value) tariff of 25 percent and miscellaneous charges levied by the LIPC. Import quotas comprise two broad categories, general and special quotas. The former accounts for 90 percent of the total quotas. Approximately 90 percent of the general quotas are controlled by the LIPC.

In June 1988, Japan reached a new beef trade agreement with the U.S. and Australia. Under the new agreement, beef import quotas will be completely removed by March 31, 1991. Before the removal of quotas in 1991, quotas will be increased by 60,000 mt per year, starting with 214,000 mt in 1987. At the same time, the LIPC's role in beef trading will be greatly reduced before 1991 and will be terminated after March 1991. The current import duty on beef is 25 percent of value on a cost-insurance-freight (*cif*) price basis. When quotas are removed in 1991, the tariff will be increased to 70 percent in 1991, then decline to 60 percent in 1992 and settle at 50 percent thereafter. The removal of quotas and termination of LIPC's role in beef trading offer an opportunity for the U.S. beef industry to penetrate the highly diversified market niche in Japan for three reasons:

1. Trade liberalization will have a limited effect on the price of highly marbled beef in Japan because imported beef products with current characteristics are not good substitutes for Japanese beef. Further, the Japanese demand for highly marbled beef is very responsive to price reductions, implying a sizable market potential;

2. The demand for imported beef has been found less responsive to price, suggesting that influx of imported beef with current product characteristics is expected to cause substantial price reductions. According to LIPC's estimates, inventory of imported beef held by LIPC and private trade increased from 66,500 metric tons in April 1989 to 117,000 metric tons in November/December 1989. Average wholesale prices of imported beef fell by more than 25 percent while the price of chilled, longer-fed carcasses from the U.S. increased from 1,200 yen to 1,250 yen per kg for the same period; and

3. Japan has relied on the U.S. for feed grains. Shipping beef to Japan is much less expensive than shipping feed grains of beef equivalent weights. Japanese cattle farms are too small in size to take advantage of economies of scale.

A good understanding of the Japanese beef grading system and consumers' preferences for beef is essential in developing profitable production/marketing strategies to expand export volume and value. A detailed discussion of the Japanese beef grading systems is presented in the next section.

JAPANESE BEEF GRADING SYSTEMS

When the first Central Meat Wholesale Market was established in Osaka in 1958, the need for standardizing the beef grading systems to facilitate trading became evident. A commission of 37 members was created in 1960 to develop "Transaction Standards for Livestock Products" by the Livestock Bureau of the Ministry of Agriculture, Forestry, and Fisheries (MAFF). The first national standards were introduced in 1961 and were implemented with slight amendments

added on four occasions until a complete overhaul occurred in 1988. These grading systems implemented are described below.

Former Beef Grading System

Beef carcasses are auctioned on an individual basis at wholesale markets. Under the former grading system, carcasses were classified by graders certified by Japan Meat Grading Association (JMGA) into six categories-- Supreme (tokusen), Superior (gokujo), 1st (jo), 2nd (chu), 3rd (nami) and utility (togai). Grading criteria included four meat quality and four carcass quality characteristics as well as a minimum weight of the left side carcass. Meat quality characteristics were marbling; meat color and brightness; meat firmness and texture; and fat color, luster, and quality. Carcass quality characteristics included shape, fleshing, fat cover, and overall appearance. All characteristics except marbling were scored on a 0 to 4 scale, with 0 being the highest. Marbling was evaluated on a 0 to 5 scale, with 5 being the highest. Minimum scores for each characteristic were required to qualify for each grade (Table 7). Carcasses with scores below the minimum requirements could still be graded Superior, 1st, and 2nd if only one meat quality characteristic (except marbling) and one carcass quality characteristic were below the minimum by one score.

Since the early 1960s, the percentage of beef carcasses graded by the JMGA has increased over time. The majority of Wagyu cattle were graded 1st or 2nd, while the majority of dairy cattle were graded 2nd or 3rd. When the grading system was devised in the early 1960s, Wagyu cattle were fattened only after being retired from years of field work and dairy cattle after several lactations. At that time, beef was used mainly for traditional dishes such as

sukiyaki and *niku-yasai*. Thinly sliced, well marbled beef were most suitable for preparing these dishes so that highly marbled beef were dearly priced.

Table 7. Minimum Standards of Beef Grades: Prior to April 1988

Grade	Minimum Standards		
	Weight of Left Side	Marbling	Other Seven Characteristics
	(kg)	(score)	(score)
Supreme	130	4	0
Superior	130	3	0
1st	120	2	1
2nd	120	1	2
3rd	100	0	3
Utility	-	-	4

Source: JMGA.

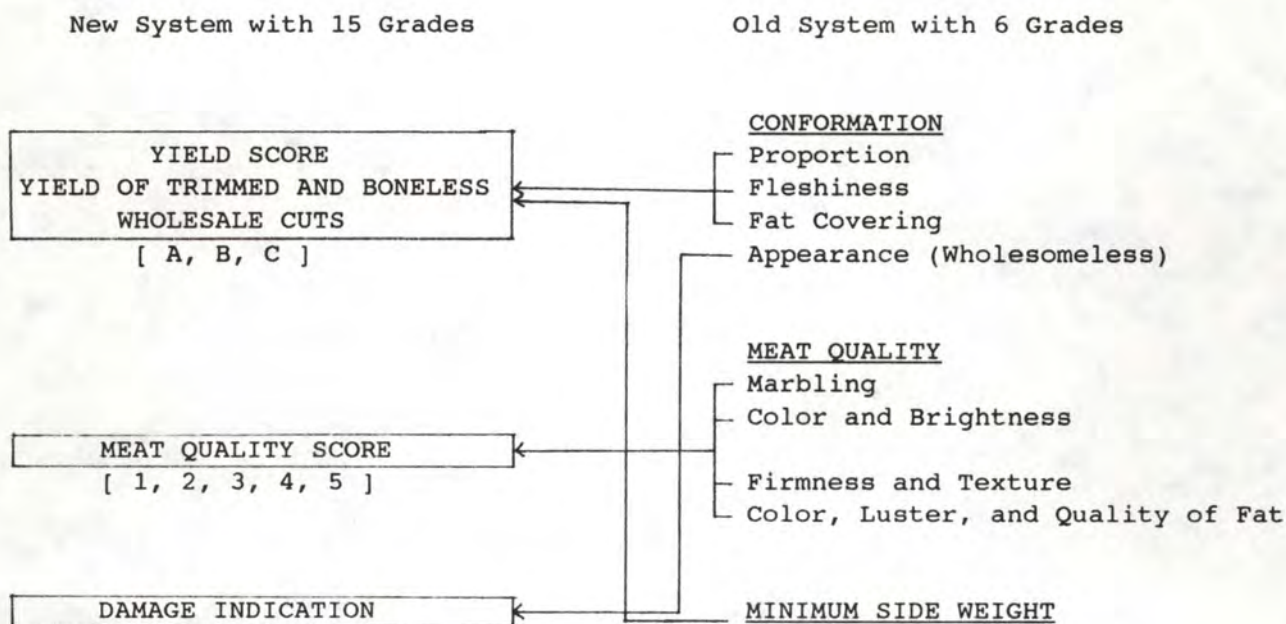
New Beef Grading System

Since April 1, 1988, a new beef grading system has been in operation with a new yield grade added, the quality grade modified, and the ribbing section standardized. These changes in beef carcass grading were motivated by the need to compete with less expensive imported beef predicted to increase substantially once the beef trade liberalization takes place. By introducing the yield grade and modifying the quality grade, the MAFF intended to de-emphasize the importance of marbling in beef carcass grading so that feeding period would be shortened and domestic production more cost competitive. Further, Beef Marbling Standard (B.M.S) and Beef Color Standard (B.C.S.) were introduced to provide additional objectivity in quality grading. Finally, the standardized ribbing at the 6th/7th section was expected to result in more objective carcass classification and more rational marketing of carcasses and primal cuts, reflecting the different demand of each region more precisely (JMGA). Under the former system, carcasses were inspected at the 7th/8th rib

section in Osaka and at 5th/6th in Tokyo. It is well known that marbling decreases and ribeye area increases as one moves back along the rib-cage.

The new system is based on a combination of yield grades (A to C with A the highest) and quality grades (1 to 5 with 5 the highest). There are in total 15 combined yield and quality grades as compared to only 6 grades in the past. Changes from the old to the new system are shown in Figure 1 and a comparison of the old grades and the new grades is summarized in Table 8.

Figure 1. Old and New Beef Grading Systems



Source: JMGA.

Yield Grades. Yield grades are determined by three carcass yield characteristics measured at 6th/7th ribs as well as by the weight of the left side carcass. These three characteristics are ribeye area (measured by grid in cm^2), rib thickness (cm), and subcutaneous fat thickness (cm). Using these four yield factors, conversion ratios of the carcass weight to the primal-cut

weight can be estimated. These conversion ratios (called yield scores) are estimated by using the following formula:

$$\begin{aligned} \text{Yield Score (\%)} &= 67.37 \text{ (dairy and other cattle) or } 69.419 \text{ (Wagyu cattle)} \\ &+ (0.130 \times \text{Ribeye Area}) \\ &+ (0.667 \times \text{Rib Thickness}) \\ &- (0.025 \times \text{Left Side Carcass Weight}) \\ &- (0.896 \times \text{Cover Fat Thickness}) \end{aligned}$$

The average yield scores are in the range of 69 (inclusive) and 72 (exclusive) and they receive grade B. Yield scores of 72 or above grade A and below 69 grade C. The formula is formed in a fashion so that yield scores distribute normally around B grade. As shown in Table 7, there were minimum weight requirements for grades under the former system. However, carcass weight (the left side carcass) has a negative coefficient in the determination of yield scores. This is one of the changes in new system which may have some dampening effect on long feeding practices.

Table 8. Comparison of Old and New Grades.

Breed	Old System	New System			
		A5	A4	B5	B4
Wagyu Steers	1st	A5	A4	B5	B4
	2nd	A4	A3	B4	B3
	3rd	A3	A2	B3	B2
Dairy Steers	1st	A4	B5	B4	C4
	2nd	B4	B3	C3	
	3rd	B3	B2	C3	C2

Source: JMGA.

Quality Grades. Quality grades of beef carcasses are determined by four quality characteristics. They are marbling; meat color and brightness; meat firmness and texture; and fat color, luster, and quality. These quality characteristics are graded from 1 to 5, with 5 the highest. Then the minimum grade of these four characteristics is the overall quality grade.

1. Marbling. Twelve Beef Marbling Standards (B.M.S.) showing the degree of marbling on a continuous scale are used to classify marbling quality. These twelve Standards (No. 1 to No. 12, with No. 12 the highest) have a one-to-one correspondence to twelve marbling scores (0, 0⁺, 1⁻, 1, 1⁺, ..., 3⁻, 3, 4, and 5, with 5 being the highest). The majority, about 40 percent, of carcasses scored in the range of 1⁻ and 1 or had B.M.S. of No. 3 and 4. B.M.S. and marbling scores are grouped into five marbling grades (1 to 5, with 5 the highest) as shown in Table 9. A comparison of the marbling grades under the old and new systems is also shown in Table 9.

Table 9. Marbling Evaluations and Grades: Old and New Systems

B.M.S.	Scores	New Grades	Old Grades
No. 1	0	1	3rd
No. 2	0 ⁺	2	3rd
No. 3	1 ⁻	3	3rd
No. 4	1	3	2nd
No. 5	1 ⁺	4	2nd
No. 6	2 ⁻	4	2nd
No. 7	2	4	1st
No. 8	2 ⁺	5	1st
No. 9	3 ⁻	5	1st
No. 10	3	5	Superior
No. 11	4	5	Supreme
No. 12	5	5	Supreme

Source: JMGA.

The intent to de-emphasize marbling in the new system is quite evident from Table 9. B.M.S. ranges from No. 8 to No. 12 were graded into 1st, Superior, and Supreme under the former system, and they are all graded 5 in the current system. Because the twelve continuous marbling standards (B.M.S.) are included in the grading sheet of the JMGA, it remains an open question whether

buyers of beef carcasses determine their price bid using Standards (a scale of 12) or Grades (a scale of 5). This question can be answered by conducting a hedonic pricing analysis in which the price of individual carcass is regressed on all yield and quality characteristics as well as sex, breed, and origin (or brand). If buyers' pricing decisions have been altered by the new system, we would expect the same estimated coefficients for B.M.S. No. 8 through No. 12. A study conducted by Lin and Mori (1990) indicates that buyers seemed to determine their price bids according to the twelve Standards rather than the five Grades. Empirical results also suggest that buyers are willing to pay 187 yen/kg for an increase from B.M.S. No. 3 to No. 6 for U.S. carcasses (Table 10). This translates into almost \$555 for a carcass of 430kg, using an exchange rate of 145 yen/dollar.

Table 10. Implicit Prices of Beef Marbling Standards

Breed	Implicit Prices (yen/kg)					
	BMS #2	BMS #3	BMS #4	BMS #5	BMS #6	BMS #8
Wagyu Steers	1,427	1,541	1,645	1,701	1,782	1,920
Dairy Steers	1,276	1,335	1,435	1,477	1,538	na
USA	1,278	1,368	1,449	1,493	1,555	na
Australian	1,176	1,252	1,319	na	na	na

Notes: 1. na is indicated when the data has no observation for that particular combination of breed and BMS. 2. The difference between BMS #6 and #7 is not statistically significant so that BMS #7 is excluded.

2. Meat Color and Brightness. Color and brightness are two attributes of this characteristic. Color is scored on a continuous scale from No. 1 to No. 7, termed Beef Color Standards (B.C.S.). Meat brightness is evaluated by visual appraisal. These two attributes are then combined to determine the

grade of this characteristic (Table 11). For example, a grade of 5 requires a B.C.S. between No. 3 and No. 5 (inclusive) and very good brightness.

Table 11. Grades of Beef Color and Brightness and Minimum Standards

Grade	Color (B.C.S. No.)	Brightness
5	No. 3 - No. 5	Very Good
4	No. 2 - No. 6	Good
3	No. 1 - No. 6	Average
2	No. 1 - No. 7	Below Average
1	Not Graded 5 to 2	

Source: JMGA

3. Meat Firmness and Texture. This characteristic has two attributes, firmness and texture, and they are classified into five grades by visual appraisal. Similar to the determination of the grade of meat color and brightness, the minimum score of these two attributes determines the grade of the characteristic in question (Table 12).

Table 12. Grades of Beef Firmness and Texture and Minimum Standards

Grade	Firmness	Texture
5	Very Good	Very Fine
4	Good	Fine
3	Average	Average
2	Below Average	Below Average
1	Inferior	Course

Source: JMGA

4. Fat Color, Luster, and Quality. Similar to other quality characteristics, there are two attributes included in this characteristic. Fat color is evaluated on a continuous scale of seven Beef Fat Standards (B.F.S. No. 1 to No. 7). Luster and quality are evaluated simultaneously by visual inspection.

The minimum standards of each attribute for grades of this characteristic are given in Table 13.

Table 13. Grades of Fat Color, Luster and Quality and Minimum Standards

Grade	B.F.S. No.	Luster and Quality
5	No. 1 - No. 4	Excellent
4	No. 1 - No. 5	Good
3	No. 1 - No. 6	Average
2	No. 1 - No. 7	Below Average
1	Not Graded 5 to 2	

Source: JMGA.

Yield (A to C) and quality (5 to 1) are indicated in each carcass with a stamp (see Table 8). The number and percentage of beef carcasses graded into the fifteen possible combinations of yield and quality grades in 1988 are summarized in Table 14. In the case of apparent damage, each grade is stamped with a superscript mark of Japanese characters. Types of damage and their associated characters are listed in Table 15.

Table 14. Distribution of Beef Carcasses in Grades
(Percentage and Head): Japan Fiscal Year 1988

Yield Grades		Quality Grades					Total
		5	4	3	2	1	
A	%	7.2	7.8	6.0	2.8	0.2	24.0
	(head)	(65,573)	(71,642)	(55,418)	(25,922)	(1,439)	(219,993)
B	%	1.5	4.9	23.6	25.6	0.9	56.4
	(head)	(13,448)	(45,252)	(215,856)	(234,359)	(8,106)	(517,021)
C	%	0.0	0.4	4.1	6.8	8.2	19.6
	(head)	(0)	(3,652)	(37,890)	(62,642)	(74,799)	(179,268)
Total	%	8.7	13.2	33.7	35.2	9.2	100.0
	(head)	(79,306)	(120,546)	(309,164)	(322,923)	(84,344)	(916,282)

Source: JMGA

Table 15. Damage and Mark

Damage	Mark
Muscle Bleeding	ア
Muscle Edema	イ
Inflammation of Muscle	ウ
External Wound	エ
Part Missing	オ
Other	カ

Source: JMGA.

PROFITABILITY OF PRODUCING HIGH-VALUED BEEF FOR JAPAN

The idea of extending the cattle feeding period and exporting longer-fed beef to Japan is not new, but it was adopted by only a handful of feedlot operators who exported live cattle for slaughtering in Japan. The importation of live cattle for slaughtering is free from quota constraints, it is, however, limited by the tight quarantine space and is subject to a tariff of 70,000 yen per head. Even though it costs about \$600 to \$1,000 per head, depending on the modes of transportation and ports of exit and entry, to ship live cattle to Japan, this was the only viable way that longer-fed cattle and beef could be imported into Japan before signing the 1988 agreement. Import quotas will be removed and the LIPC will discontinue its function in beef trading in 1991, thereby facilitating exports of longer-fed beef to Japan.

Cattle are usually fed around 130 days for the U.S. domestic market. In this study, we propose the feeding program be extended from the conventional 130 days to 260 days. The additional 130 days feeding period is termed the second phase of the extended feeding program. The conventional feeding program involves feeding 750-pound feeder steers to a finish weight of 1,150 pounds with an average daily gain of 3.07 pounds in weight.

Probable Receipts

Probable receipts for feeding cattle high-concentrate diets for 260 days in Idaho are estimated using the following procedure: first, the current (January, 1990) wholesale prices of chilled carcasses imported from the U.S. sold in the Tokyo Wholesale Market are used to represent the wholesale price of U.S. longer-fed beef; second, expenses for the wholesale market commission in Japan, miscellaneous import charges, wholesale market markups, transportation charges between Idaho and Japan and tariff levied by the Japanese government are deducted from the wholesale price to derive an *fob* carcass price in Idaho; third, slaughtering and processing costs and value of by-products are then factored into the calculations to estimate an Idaho carcass basis price; and finally, the receipts are converted from carcass to live weight basis.

According to our interviews with the Japanese beef industry, cattle fed high-concentrate diets for 260 days might be graded between B4 and B2 and valued, on the average, at 1,250 yen/kg or 567 yen/lb. The tariff rate of 70 percent and the wholesale market commission of 3.5 percent are used in the analysis. Edible beef diaphragm has been imported free of quantity restrictions and under a tariff rate of 15 percent since 1985. Therefore, the ratio of wholesale price to *cif* price for diaphragm could be used to estimate the same ratio for beef after 1991. The ratio for diaphragm ranges from 1.18 to 1.95 with an average of 1.40 for the period 1985-1988. The ratio of wholesale to *cif* price for beef after 1991 is assumed to be 195 (100 + 40 - 15 + 70) percent. The air freight rate for chilled carcass is reported to be, on the average, \$0.60/lb and is likely to decline when export volume increases.

Therefore, the 1990 *fob* carcass price in Idaho is estimated to be \$1.34/lb using an exchange rate of 145 yen/dollar.

$$567 (145 \times (1 - 3.5\%) = (P_{fob} + 0.60) \times (1 + 70\% + 25\%) \rightarrow P_{fob} = \$1.34/lb.$$

Slaughtering and processing costs and value of by-products were assumed to be \$0.09/lb and \$0.06/lb carcass weight, respectively. In addition, yearling steers are assumed to reach a finish weight of 1,410 pounds and have a dressing ratio of 62.5 percent. These assumptions are reasonable as compared to the average weight of carcasses imported from the U.S. and sold in Tokyo in early 1990. Using these assumptions, the probable gross receipts for steers fed 260 days in Idaho are estimated to be \$1,150 per head or \$81.57/cwt live weight, as shown below:

$$1410 \times 62.5\% \times (1.34 - 0.09 + 0.06) = \$1,150/head$$

Probable Cost

Production costs of the extended feeding program are estimated by using the production costs of the conventional feeding program discussed in the 1989/1990 Idaho Livestock Enterprise Budgets (Smathers, et al., 1989). Using the concept of opportunity cost, the market value of the cattle finishing the conventional feeding program is treated as the cost of the feeder steers of the extended feeding program. The market value was \$724.50 per head and the total cost was \$738.63 so that there was a net loss of \$14.13 for each steer that finished the conventional feeding program in 1989. Fixed costs of the second phase are assumed to be identical to those of the conventional program, since the extended program is twice the conventional program in duration. However, the variable cost of the second phase is assumed to be \$10 per head more than the conventional program due to an adjustment in interest costs.

Death loss is, on the average, 0.91% for the conventional feeding program and is assumed to be 1 percent for the second phase of the extended feeding program. These costs are shown in Table 16.

The average feed conversion rate is approximately 7.75:1 for the conventional program. The feed conversion rate for the second phase of the extended program is not known with certainty. A conservative conversion rate of 11.75:1 is assumed in this study. The costs, expected profits, and break-even prices (\$/lb) of the two feeding programs are summarized in Table 16.

Table 16. Production Costs, Expected Profits, and Break-Even Prices of Conventional and Extended Feeding Programs: 1989/1990

	Conventional Program	Extended Program
Conversion Rates	7.75	11.75
Variable Costs (\$/head):		
Steer	532.50	724.50
Feed Ration	133.13	131.20
Others (including death loss)	63.36	75.95
Total	722.36	931.65
Fixed Costs:	16.27	16.27
Total Costs:	738.63	947.92
Expected Revenues	724.50	1,150.14
Expected Profits	-14.13	202.22
Break-Even Prices (\$/cwt) of Steers in Idaho to Cover		
Variable Costs:	62.81	66.61
Total Costs:	64.23	67.23

Expected Profits and Cautions

By comparing probable receipts and costs of the extended feeding program, the profit for the extended feeding program is estimated to be \$14.28/cwt live weight or \$202/head using the 1990 Tokyo carcass price, an exchange rate of

145 yen per dollar, and a feed conversion ratio of 11.75:1. Therefore, it is clear that producing longer-fed beef for the Japanese market is one of promising production and marketing alternatives for the U.S. beef industry when the beef import quotas are lifted in 1991.

It should be stressed that the profitability of producing longer-fed beef for the Japanese market depends on the wholesale carcass price in Japan. It is assumed that cattle fed 260 days are priced at 1,250 yen per kg. We believe that this assumption is reasonable, even conservative, at the present time. It should, however, be closely monitored. It is well known that price is determined by demand and supply conditions in free markets. Because the U.S., Australia, and other countries such as Canada have the ability to supply grain-fed beef to Japan and the Japanese beef farmers will be heavily subsidized by their government (Yoshioka) to survive trade liberalization, it is important to monitor the future supply of longer-fed beef in Japan in order to predict the probable wholesale price of longer-fed beef in Japan.

In addition to these factors, there are several other crucial considerations which have drastic impacts on the profitability of these ventures. These factors may translate into a higher degree of risk associated with the new endeavor and can be divided into four broad areas:

First, exchange rates between the U.S. and Japan, and Australia and Japan will impact the relative profitability of the strategy analyzed in this case study. It is found that when the exchange rate exceeds 170 yen per dollar, producing longer-fed beef for the Japanese market becomes unprofitable. Therefore, fluctuation in exchange rates will increase the

business risk to the feedlot operators, packers, exporters or other players involved in the potential exportation of beef.

Second, shipping costs by air or sea between the U.S. and Japan and Australia and Japan affect significantly relative profit of exporting beef. The transportation cost is assumed to be \$0.60 per pound which accounts for 45 percent of the *fob* price. It is believed that the transportation cost is likely to decline when the export volume increases and when shipping chilled carcasses by sea is used. Therefore, the importance of monitoring changes in transportation costs can not be overemphasized.

Third, tariffs are levied on the *cif* price which includes shipping costs. The current tariff of 25 percent will be raised to 70 percent in 1991, 60 percent in 1992, and 50 percent in 1993. The drastic effects of exchange rates, shipping costs, tariff levy, prices, and costs on the profitability of producing longer-fed beef for Japan can be calculated easily using a computer program developed by Lin, Mori, and Stodick (1990).

Fourth, the risk or chance of not making the grade or standard for higher quality beef in Japan will negatively impact expected prices. Given the fact that longer-fed beef usually implies fatter animals which in turn implies lower yield grade and thus potential price discounts on the U.S. market. Thus, producing for the Japanese market would appear to be closing the door on segment of the domestic market.

SUMMARY

Due to health concerns and price competition from other meats, U.S. beef consumers have registered an increasing preference for lean beef and a declining per capita consumption. As a reaction to this changing consumption pattern, the U.S. beef industry has engaged in research programs to produce

lean and less expensive beef. Meanwhile, many people believe that a liberalized Japanese beef market will provide a drastically expanded export market for U.S. beef and hence offer a partial solution to the marketing problems facing the U.S. beef industry.

During past trade negotiations between the U.S. and Japanese governments, literature concerning the Japanese beef market has proliferated. One of the major findings in the literature is the realization that beef in Japan can be classified broadly into three classes, Wagyu, dairy, and imported beef. Substantial price differentials exist between these three types of beef, and they have widened over time. These price differentials represent the Japanese willingness to pay an extremely high price premium for marbling, the most important quality attribute in the Japanese grading system. Because Japanese domestic beef, even the fed-dairy beef, and imported beef with current product characteristics are quite distinct in quality, these two types of beef are believed to be weak substitutes. The recent surge in the inventory of imported beef and sharp decline in the price of frozen imported beef further support this proposition. This finding suggests an opportunity for the U.S. beef industry to better serve the highly diversified beef markets in Japan.

The profitability of extending the feeding period from the conventional 130 days to 260 days is examined by using 1989/1990 Idaho feedlot production budgets and wholesale prices of chilled, imported carcasses in Tokyo. Results suggest that extending the cattle feeding period is a promising production/marketing strategy for Idaho's feedlots. Because these results are derived from several critical assumptions, future research is still warranted in order to generate the following information: 1) the optimal combination of

feed ration, breeds of cattle, and the length of feeding program for producing the type of beef preferred by Japanese consumers; 2) the quality characteristics and their associated prices of beef produced in the U.S. for Japan; 3) the future domestic and import supply of various beef products in Japan; and 4) price and yield risk associated with producing for the Japanese beef market.

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