

*Public VERSION*

THE COMPETITION TRIBUNAL

IN THE MATTER of an application by the Director of Investigation and Research for orders pursuant to section 92 of the Competition Act R.S.C. 1985, c. C-34, as amended;

AND IN THE MATTER of the acquisition by Hillstown Holdings (Canada) Limited of 56% of the ~~common shares of~~ Canada Packers Inc.

B E T W E E N:

THE DIRECTOR OF INVESTIGATION AND RESEARCH OTTAWA, ONT.

<b>COMPETITION TRIBUNAL</b> <b>TRIBUNAL DE LA CONCURRENCE</b>	
F I L E D	AUG 9 1991 <i>RB</i>
REGISTRAR - REGISTRAIRE	
<i># 75(a)</i>	

Applicant,

- and -

HILLSDOWN HOLDINGS (CANADA) LIMITED,  
MAPLE LEAF MILLS LIMITED,  
CANADA PACKERS INC. and  
ONTARIO RENDERING COMPANY LIMITED

Respondents

AFFIDAVIT OF DR. ERNA H.K. VAN DUREN

I, Dr. Erna H.K. van Duren, of the City of Guelph, in the Province of Ontario, MAKE OATH AND SAY:

1. I received a B.A. degree in Applied Economics and Political Science from the University of Waterloo in 1985, a M.Sc. degree in Agricultural Economics and Business from the University of Guelph in 1987, and a Ph.D. in Agricultural Economics and Business from the University of Guelph in 1989.

2. I am currently an assistant professor in the Department of Agricultural Economics & Business at the University of Guelph, teaching courses in business policy and international business.

3. I have authored and co-authored numerous publications concerning international trade law, public policy and competitiveness in the North American agricultural context.

4. I have been retained by Maple Leaf Foods Inc. to provide an opinion on trends in the North American red meat industry and the implications of these trends on the merger between Rothsay rendering operation and Orenco. I have also been asked to provide a forecast of the red meat renderable supply for the next 5 years.

5. My ability to comment and advise Maple Leaf Foods Inc. is based on my personal research in the areas of international trade and competitiveness in the North American Agricultural context. I have also been provided with and have had full access to information from Maple Leaf Foods Inc. about its rendering operations.

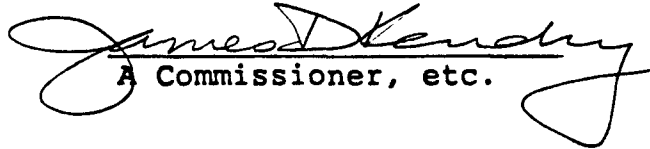
6. Attached hereto as Exhibit "A" to this my affidavit is a true copy of the report prepared for Maple Leaf Foods Inc. pursuant to their request.

Sworn before me at the )  
City of Guelph, in the )  
Province of Ontario )  
this 2<sup>nd</sup> day of August 1991.)

Erna van Duren  
Dr. Erna H.K. van Duren

James D. Kennedy  
A Commissioner, etc.

This is Exhibit "A" to the  
Affidavit of Dr. Erna H.K. van Duren,  
Sworn before me on the 2<sup>nd</sup> day  
of August, 1991

  
A Commissioner, etc.

DR. ERNA H.K. VAN DUREN

**Trends in the North American Red Meat Industry  
and the Supply of Renderable Red Meat Material in Ontario**

**Report of Dr. Erna van Duren**

**A. Introduction**

1. The merger of Canada Packers' and Maple Leaf Foods' rendering plants in Ontario is consistent with trends in the North American red meat industry. Mergers of this type must be allowed in Canada's red meat industry if firms in the Canadian industry are to survive and be competitive with their U.S.A. counterparts.

2. This report proceeds as follows. Section two explains the structure and operation of the red meat industry in North America and documents the technical and economic roles of the rendering component of the red meat industry. Section three discusses how factors in the business environment of the meat industry in North America are inducing a restructuring of the industry. Section four discusses the nature of the restructuring that has occurred and continues to occur. Section five evaluates the competitiveness of Canada's red meat industry relative to the U.S.A. industry and diagnoses the sources of Canada's competitive disadvantage.

3. This report also contains a forecast of the supply of renderable red meat material available in Ontario from 1991 to 1995. The technical component of the forecast is included in Appendix 2. In this report, the figures, which are referred to in the text, are contained in Appendix 1. Tables are included in the text.

**B. The North American Red Meat Industry**

4. The red meat industry comprises several interlinked components, which continue to become more integrated. Although, the red meat industry produces beef, pork, sheep and lamb, as well as other meats, beef and pork are by far the most valuable products. Therefore, the discussion of the

red meat industry focuses on these products.

**(a) Raw Material**

5. Raw material for the red meat industry is supplied by hog and cattle producers. Beef cattle are produced in two interrelated steps, which are conducted on the same farm with lower frequency than in the past.

**(b) Cattle**

6. Ranchers or cow-calf operators raise herds of beef cows, in order to produce calves that are fed to marketable weights. A portion of the calves produced by the cow-calf component of the industry are slaughtered, but most are sold to feedlots. When beef cows become unprofitable (sufficiently unproductive given cow prices, feed costs, etc.) they are also sold for slaughter. Given that beef cows are the ultimate source of beef cattle, the slaughter of beef cows is inversely related to profitability of feeding cattle. As steer and heifer prices increase, fewer cows become available for slaughter. Cows produce mostly lower quality beef. The inverse relationship between steer and heifer prices and the quantity of slaughter is evidence of the cattle cycle. It is more apparent in cow slaughter since higher steer and heifer prices induce ranchers to hold back cows for breeding. Only after the increase in the cow herd has produced an increased quantity of steers and heifers for slaughter can cattle slaughter increase. This interaction of biological and economic factors causes the cattle cycle, which is approximately eight to ten years in length. It can be verified statistically (Epp, 1988).

7. Feedlots use purchased feed to feed cattle controlled rations until they reach a desired weight. Fed cattle, steers and heifers, produce mostly higher quality meat, although some of their meat products are of a lower quality. Cattle are also used to produce a variety of co-products and by-

products. These are discussed in the next section.

**(c) Hogs**

8. Hog production is less compartmentalized than cattle production. However, there are farmers that specialize in producing weaner pigs, while others are in farrow-to-finish operations. The breeding stock in the hog industry, sows and boars, are also marketed, but they comprise a less important component of raw material supply than in the cattle industry due to biological factors. Hogs are used to produce a variety of products, including high and low quality cuts. They also yield a variety of co-products and by-products, which are, again, discussed in the next section.

**(d) Products Produced**

9. The red meat industry produces a variety of beef and pork products. The beef segment of the red meat industry continues to undergo change.

**(e) Beef Products**

10. The beef industry continues to switch toward boxed beef products, and away from trade in carcasses. Conventional boxed beef is a partly processed product that is sold to other processors and retailers. International Beef Processor's (IBP's) boxed beef program is the most developed, and it sells various boxes of beef. High quality boxes contain chuck cuts, rib cuts, loin cuts and round cuts, while the lower quality boxes contain thin meat cuts and ground beef. Figure 1 illustrates the products that are produced from a typical steer. Buyers select the type of box that allows them to cut and produce the products they desire.

11. The boxed beef approach is more efficient than trading in carcasses because transport costs are relatively lower and because buyers can purchase products that more closely match their needs.

Boxed beef is most important in the high quality beef industry, which is served by the large scale, geographically concentrated plants that slaughter steers and heifers. It is not well developed in the cow market. In this segment of the industry plants are smaller and more geographically dispersed. High and low quality beef typically accounts for more than 90 percent of the value of a beef animal. This percentage, along with the others presented in paragraphs 11 to 17, were derived from data obtained from Maple Leaf Foods.

12. The beef industry's drive to increase profits for these high and low quality products is paramount. For example, IBP, the U.S' largest red meat processor, continues to make investments in state of the art beef and pork plants so that it can produce and market quality red meat products in the very competitive North American meat market (IBP Annual Report, 1989). In addition to the high and low quality beef cuts produced by the beef segment of the industry, it also produces several important co-products and by-products.

**(f) Beef Co-products**

13. Co-products consist of hides and fancy meats (glands / organs). The value of these depends on how effectively a firm can develop a market for these products, and because large firms are better able to do this they, are generally able to obtain better prices. However, co-products generally account for about 5-7 percent of the value of a beef animal.

**(g) Beef By-products**

14. By-products from beef packing activity are named as such because they account for a very small proportion of the beef animal, generally less than 2 percent. By-products include edible fat and bones, material that is used for pet food, inedible rendering products and blood.

**(h) Pork Products**

15. Pork products, both the higher and lower quality cuts, are traded as cuts and include hams, backs, loins and bellies/sides. Pork products, as opposed to co-products and by-products, comprise a relatively larger proportion of a hog than a beef animal. Figure 2 illustrates the products that are produced from a hog. In value terms, high and low quality pork products account for approximately 95 percent of the value of a hog. Boxed meat has not become popular in the pork industry.

**(i) Pork Co-Products**

16. As in beef, co-products are also produced from hogs. However, in the pork industry these are relatively less important than in the beef industry since they comprise only fancy meats (glands and organs). Co-products account for 3-4 percent of the value of a hog.

**(j) Pork By-Products**

17. Pork by-products consist of edible fat and bones, material made into pet food, skins, inedible rendering material and blood. By-products account for approximately 2 percent of the value of a hog.

**(k) Summary**

18. Although the beef and pork segments of the red meat industry produce a variety of high and low quality products, several co-products and a number of by-products, high and low quality meat products account for the overwhelming share of the value of beef and pork animals.

**C. The Business Environment of the North American Red Meat Industry**

19. Several elements of the business environment that firms in the North American industry operate in continue to interact in a manner that requires firms to restructure if they are to survive



and be competitive. The relevant factors fall into two interrelated groups. The importance and effects of these factors on the strategies of firms in the red meat industry, and the operation and performance of the industry, are discussed in this section.

**(a) Demand for Red Meat**

20. The demand for red meat, or more importantly, the apparent continuing decline in red meat demand, continues to exert a significant influence on meat firms and thus the industry. Figure 3 demonstrates the decline in red meat consumption that has occurred in the U.S.A. and Canada from 1970 to 1989, and the simultaneous increase in consumption of poultry meat.

21. Two interacting factors explain the decline in demand for red meat: relative prices, and the change in consumer tastes and preferences associated with health concerns. Academic and industry studies on the reasons for the decline of demand in red meat vary in the relative importance they assign to these factors (Purcell, Choi and Sosin, Eales and Unnevehr, Chavas, Moschini and Meilke). Changes in consumer tastes and preferences away from red meat and to poultry and non-meat products are attributed to consumer concerns with the healthiness of red meat and the relative inconvenience of red meat. Although scientific studies do not generally conclude that beef, or pork, are bad for one's health relative to poultry, many consumers perceive this to be the case. Both the beef and pork industries continue to work towards changing this perception, both through advertising and by further reducing the amount of fat in the product.

22. The relative price of red meat has also been advanced as an explanation for the decline in beef demand. However, the relative price of beef and pork declined in both the U.S.A. and Canada from the 1970s to the 1980s. This is apparent from Figures 4 to 7, which contain the relative price indices for beef and pork in the U.S.A. and Canada for 1970 to 1989. The index is equal to zero in 1988. Thus, a point below zero indicates that the relative price of the product was lower, while a

point above zero indicates the relative price was higher. In the graphs for pork in Canada, and beef and pork in the U.S.A., the points for the 1980s are clustered below and to the left of the points for the 1970s; indicating a decrease in consumption and lower relative prices. In the graph for beef in Canada the pattern is less clear, but it apparent that consumption has decreased relative to the 1970s when average relative prices were approximately similar.

23. In summary, the data in Figures 3 to 7 imply that the decline in demand for red meat is largely driven by shifts in consumer tastes and preferences. Thus, in order to sell a given quantity of red meat today, as opposed to the 1970s, red meat firms must be able to make the product available at a lower price.

**(b) Supply of Red Meat**

24. The supply of red meat is determined by the interaction of economic forces at the retail, processing and farm level.

**(c) Farm Level Factors**

25. At the farm level, specialization and consolidation continue, and more beef and pork can be produced from a given breeding inventory. The evidence for both Canada and the U.S.A. is impressive. From 1970 to 1990 meat output per head of inventory increased at the following compounded annual growth rates:

*	Beef	U.S.A.	1.1 %
*	Beef	Canada	1.3 %
*	Pork	U.S.A.	1.2 %
*	Pork	Canada	0.7 %

The increases in technical efficiency at the farm level have resulted in higher quality cattle (less fat

per carcass), which therefore yield lower proportions of renderable material. The industry is continuing in its efforts to improve technical efficiency, as discussed on pp. 18-20 of the report by Dr. Fred. D. Bisplinghoff. The trend is similar in direction, but smaller in magnitude, for hogs.

**(d) Processing Level Factors**

26. At the processing level availability of quality raw material, cost effective labour and economies of scale are the determinants of supply. As discussed above, the supply of quality raw material has improved over the last two decades. Cost effective labour and scale go hand-in-hand since labour costs per unit of output decrease if scale of operation increases. The cost reductions associated with increases in scale are substantial in the beef industry. In a 1988 study conducted for the Research Institute on Livestock Pricing in Virginia, U.S.A., Ward determined that the average cost of slaughtering steers and heifers in a single shift plant decreased by US\$7.00 per head if throughput was increased from 145 head to 325 head per hour. The average cost of fabricating and boxing the beef declined by US\$10.00 per hour for the same increase in throughput. Thus, for a slaughtering and boxing operation the cost reduction associated with increases in scale are substantial; totalling US\$17.00 per head.

27. Beef processing plants continue to become more concentrated geographically. Figure 8 demonstrates the increase in North American share for cattle slaughtered in the top 10 cattle producing states in the U.S.A. and three Canadian provinces: Ontario, Alberta and Quebec. The substantial gain by the top 10 U.S.A. states explains how beef packing firms have been able to decrease transfer costs for cattle. Shorter distances to the processing plant reduce transport costs, eliminate middlemen and improve the quality of cattle entering the plant.

28. Data on processing costs by scale of pork processing plants are not available for either the U.S.A. or Canada. However, the trends are similar, but not as extreme. Figure 9 demonstrates the

increase in North American share for hogs slaughtered in the top 10 hog producing states in the U.S.A. and three Canadian provinces: Ontario, Alberta and Quebec. The pattern is the same as for cattle. The top 10 U.S.A. states display a substantial gain, greater than for beef interestingly. Pork packing plants are also reducing transfer costs, again by transporting hogs over shorter distances, eliminating middlemen and improving the quality of hogs entering the plant. IBP's continuing expansion into the hog industry is being achieved by opening new plants in this region. IBP now has 5 plants in Iowa, the state that produces approximately one-quarter of all the hogs in the U.S.A.

29. Larger scale plants can also achieve economies of scope. Operations that may not be profitable in smaller plants may be in larger plants because of higher throughput and thus adequate supplies for developing and serving specialized markets. The continuing movement to larger plants and the attendant scale and scope economies imply that an increasing portion of red meat material is rendered at the source of processing.

**(e) Retail and Hotel, Restaurant and Institutional Factors**

30. Several factors that originate at the retail and hotel, restaurant and institutional (HRI) level of the red meat market affect the supply of meat. Food service is becoming increasingly important to the red meat industry, as consumers continue to consume a higher proportion of the disposable income they spend on food on meals away from home. Since consistency and reliability of supply are critical success factors in the food service industry, a growing portion of beef is sold in portion-controlled vacuum packaging. Pork products are also becoming available in boxed form. These developments reduce the amount of renderable material available at the final consumption level.

**(f) Other and Synthesis**

31. As discussed above, several supply and demand factors in the red meat industry are interacting

to produce changes in the industry that have the effect of reducing the amount of renderable red meat material produced.

**D. Change in the Red Meat Industry**

32. The decline in demand for red meat and the significant cost savings that can be realized from increases in the scale of processing have led the red meat industry, especially the beef segment, to increase the scale of plants in order to realize these cost reductions and be able to sell their products at the lower prices required to move the product in consumer markets. A low delivered cost strategy has become critical to success in the primary end of the meat processing industry. And although value-added processing is becoming more important in the red meat industry, this component of the industry must also be price competitive with other meats in order for this industry to sell its product.

33. In a market with declining, or at best stagnant demand, the strategic and structural change required for survival and competitiveness can only be achieved by reducing the number of firms in the industry. Mergers and the closing down of several old plants and replacing them with new, more efficient plants are the only ways of achieving the structural change required for survival. All this implies an increase in concentration, and this has definitely been occurring over the last two decades.

34. It is difficult to get comparable data on concentration in the red meat industry in Canada and the U.S.A. However, Figures 10 and 11, together indicate the intensity of the increase in concentration in the U.S.A. and the lag in this activity in Canada. Figure 10 contains the proportion of slaughter of several types of cattle and hogs conducted by the top four firms in the U.S.A. The increase in concentration is greatest for steer and heifer slaughter, while it is much lower for cow and bull slaughter. This is because scale and scope economies have significantly greater impact on costs in this component of the industry, than in cow and bull slaughter. The latter type of plants also tends to be more geographically dispersed. The concentration in hog slaughter has been fairly constant in

the last 15 years, but there are indications that it may be increasing also.

35. There are no data for the proportion of cattle and hogs slaughtered by the top four firms in Canada. Thus, a direct comparison of slaughter concentration ratios cannot be made. However, the output of beef and pork products per plant in the red meat industry can be calculated from production and Census of Manufacturers data. Figure 11 contains the results of this analysis for Ontario, Canada and the U.S.A. The difference in scale among Ontario, Canada and the U.S.A. is frightening in an industry in which a low delivered cost strategy, achievable largely through scale, are required for success.

36. The scale of plants in Canada, on average, is significantly higher than in Ontario, and the difference between Canada and the U.S.A. is greater yet. Ontario's industry is obviously at a considerable competitive disadvantage on scale of production. Figure 12, which contains the results of the calculation of output of beef and pork per production worker in Ontario, Canada and the U.S.A. indicates that Ontario's scale disadvantage has a considerable impact on the productivity of the labour used in the industry.

#### **E. Competitiveness of the Ontario and Canadian Red Meat Industries**

37. Measuring the competitiveness of an industry is difficult conceptually and empirically. In the research that I am currently involved in, in conjunction with Dr. Larry Martin and Dr. Le Maguer of the University of Guelph and Dr. Randy Westgren of McGill University, we have developed a framework for assessing competitiveness at the industry level. The framework and results for Canada's food processing industry are contained in several studies.<sup>1</sup> The results of applying this framework to the red meat industry in Ontario, and in Canada, are broadly summarized in Figures 13 to 17.

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<sup>1</sup> The research is contained in several studies, in particular: Martin, L., E. van Duren, R. Westgren and M. Le Maguer. Competitiveness of Food Processing in Canada. Prepared for Industry, Science and Technology Canada, Food Policy Task Force. May 1991 and Martin, L., E. van Duren, R. Westgren and M. Le Maguer. Competitiveness of Ontario's Agrifood Sector. Prepared for the Government of Ontario, May 1991.

38. The Ontario and Canadian red meat industries do well relative to the U.S.A. in terms of generating value added as a proportion of sales (Figure 13). In terms of adding value per unit of labour or production worker (Figure 14), and relative to the production wage bill (Figure 15), the Ontario industry performs better than the Canadian average. However, per plant it compares poorly to Canada on average (Figure 16). And on value-added per production worker, per the wage bill and per plant, the Ontario industry compares poorly to the U.S.A.

39. Ontario's share of the North American red meat industry's total sales has averaged between 3 and 4 percent, while the Canadian industry has been above 10 percent, and continues to increase slightly. Western Canada continues to increase its share of Canada's red meat processing activity, particularly in the beef segment of the industry. Figures 8 and 9 demonstrate this. Although there continue to be minor trade barriers for red meat within the North American market, the industry is truly continental. Prices in Ontario and Canada are determined by North American market forces, and production, consumption and trade decisions follow from this continental pricing mechanism.

40. The foregoing suggests that the scale of plants in Ontario's red meat industry is its major source of competitive disadvantage. The Ontario red meat industry produces good value-added products, has productive workers and relatively competitive wages. However, the productivity of its workers and the contribution of Ontario's red meat industry's product to the competitiveness of the industry would be enhanced if firms could operate on a larger scale. Due to the lack of cattle supplies, an increase in plant size (with an attendant increase in concentration) is not feasible in beef processing. It is possible in pork packing, and it is certainly feasible in the rendering industry. Thus, although the options for increasing the average scale of plants in Ontario, and by implication in Canada on average, are limited, there are ways. The merger of Canada Packers' and Maple Leaf Foods' rendering plants would be an excellent start.

**F. The Supply of Renderable Red Meat Material Available in Ontario, 1991 to 1995**

41. The changes that have been occurring and that continue to occur in the North American red meat industry have significant implications for the supply of red meat material that will be available in Ontario in the future. In order to determine the impact of these changes on the supply of renderable red meat material in Ontario, a technical model of the supply of renderable red meat material for Ontario, Canada and the U.S.A. was developed. This model can be used in conjunction with independent estimates of cattle slaughter and trends in the North American red meat industry to produce supply forecasts of renderable red meat material for the regions indicated above. Figure 18 contains a flowchart of the renderable red meat supply model. The structure of the model is explained with reference to Figure 18. This is followed by a discussion of the forecasts, and the results.

**(a) A Model of Renderable Red Meat Supply**

42. Several factors influence the supply of red meat that is available for rendering in Ontario. They derive from economic and technical relationships at the farm level, the processing level and the retail level. The major factor in a model of renderable red meat supply is the supply of cattle and hogs. The supply of cattle and hogs can be estimated using econometric models of the economic behaviour of the firms involved in the beef and pork industries or by examining trends and relationships. An econometric model that would adequately represent the rendering component of the red meat industry would require estimating and integrating several supply and demand relationships for different components of the industry. No such model is available. It would also be very difficult, if not impossible, to construct, given the pace and depth of change that is occurring in the red meat industry. In the fall of 1990, in a study of the Canadian Meat Import Act, I, in conjunction with Dr. Larry Martin of the University of Guelph and two private consultants spent



considerable effort on developing part of such a model for the beef industry. We learned in that effort that many of the specifications that had been used in modelling the North American cattle and beef industry during the 1970s and 1980s no longer performed satisfactorily.

43. Given the expected impossibility of constructing an econometric model of the beef component of the North American red meat industry, I chose to follow an approach which relies on technical relationships and an understanding of trends and relationships in the red meat industry. This approach also allows a more precise focus on the rendering component of the red meat industry.

44. Figure 18 indicates that three sets of data determine the supply of renderable red meat material in Ontario, Canada and the U.S.A. The slaughter of cattle and hogs is the major determinant, followed by the carcass weights of cattle and hogs and finally the proportion of a cattle or hog carcass that is ultimately available for rendering. The supply of red meat products, of which some portion would be rendered, that is imported into Ontario is not explicitly included in this model because it is declining in importance. There are two interrelated reasons for this. First, Ontario is increasing its imports of boxed beef. Second, the rendering industry has not determined what portion of this product enters the rendering stream, but it is relatively small.

45. Annual cattle and hog slaughter data for Ontario, Canada and the U.S.A. were obtained from Agriculture Canada and the U.S.A. Department of Agriculture, as were average carcass weights. Appendix 2 contains the relevant data. Yield factors, for the proportion of a cattle and hog carcass that is rendered, were developed using technical information supplied by the Canadian Meat Council, the American Meat Institute and Maple Leaf Foods. Figures 1 and 2 summarize the information obtained from Maple Leaf Foods and Appendix 2 integrates it with the data obtained from the other sources. To account for the increased efficiency with which the red meat industry is producing red meat from a given animal (see section 3.2.1), a productivity trend was also incorporated in the yield calculation. Last, since a portion of red meat is purchased for consumption at home, and thus does

not enter the rendering stream, this portion was excluded from the yield factors. The exclusion factor was calculated by determining what proportion of the red meat industry's shipments were not further processed.<sup>2</sup> The result was adjusted by the proportion of disposable income that is spent on food - which is consumed at home. These data are available for 1970 to 1989 for Canada and the U.S.A.

46. The model produces several sets of information. The information that is summarized in this report consists of:

- (1) the average supply of renderable red meat material in Ontario, Canada, the U.S.A. and North American for five periods comprising five years each (1971-1975; 1976-1980; 1981-1985; 1986-1990, 1991-1995),
- (2) the average supply in each of these five years periods indexed to the base year of 1990,
- (3) the average year over year change in the supply of renderable red meat material within each of the five year periods,
- (4) the share of the North American supply of renderable red meat material that Ontario, Canada and the U.S.A. accounted for in each of the five year periods, and,
- (5) the proportion of the renderable red meat material that is derived from beef in each of the five year periods, for Ontario, Canada, the U.S.A. and North America (the remainder would be derived from pork).

In addition, an appendix contains the same detailed information outlined in (1) to (5) above for renderable red meat material derived from cattle and hogs. The relevant tables are tables 6 to 8 in appendix 2.

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<sup>2</sup> U.S. industry data had to be used for this adjustment since Canada's Census of Manufacturers does not contain the required level of detail.

**(b) Procedures and Information Used to Forecast Renderable Red Meat Supply**

47. Three sets of information and two procedures were used to forecast the supply of renderable red meat material in Ontario, Canada and the U.S.A. The supply for Canada and the U.S.A. was summed to determine the supply for North America. The rationale for each of the three approaches is indicated below. The quantitative results for 1991 to 1995 are discussed in the final section of this report.

**(c) Forecast 1**

48. Agriculture Canada's Medium Term Forecast of inspected cattle and hog slaughter is used as the basis for this forecast of renderable red meat supply in Ontario for 1991-1995. Only Agriculture Canada's forecast of cattle and hog slaughter was used in the renderable red meat supply model. Carcass weights were assumed to be constant at their 1990 levels, as were all other technical coefficients in the model.

49. The Agriculture Canada forecast is a logical choice for the information on cattle and hog slaughter that is required to forecast Ontario's renderable red meat supply since it is based on a complete, integrated, computerized model of Canada's cattle and beef industry. Researchers at Agriculture Canada have developed and maintained this model since the mid 1970s and spent considerable time and effort in continuously improving it. In the agricultural economics profession we refer to the models that have been developed for individual agrifood sectors as the Agriculture Canada FARM models.

50. Unfortunately, the nature of Agriculture Canada model for the meat industry, and in particular the fact that Agriculture Canada's forecast is a medium term forecast, make it largely unsuitable for forecasting the supply of renderable red meat material in Ontario. First, since it is a medium term forecast, five years. Thus, it does not adequately reflect long term trends in the industry.

At least an eight to ten year forecast is needed to estimate long term trends. Second, since the Agriculture Canada meat industry model is based on three regions (the U.S.A., Canada East and Canada West), it has virtually no structure that deals with meat packing and by construction, in many cases, assumes that prices in the Canadian industry are simple functions of prices in the U.S.A. industry. It is incapable of adequately capturing the dynamics of change occurring in the red meat industry. Third, since the Canada East component of the Agriculture Canada model is largely a function of the Canada West component of the model, the model cannot produce an independent forecast of prices and supplies for Canada East and Canada West. Therefore, Agriculture Canada only reports a forecast for Canada as a whole, and it is impossible to obtain an independent forecast for Ontario. In combination these three factors imply that the best forecast for Ontario that can be made using the Agriculture Canada cattle and hog slaughter forecast is one that assumes that Ontario's trend is identical to Canada's in the medium term. Such a forecast simply ignores the implications that the important structural changes that have occurred, and continue to occur, in the North American red meat industry, have for the supply of renderable red meat material in Ontario in the next five years.

51. To address the inadequacy of the forecast of renderable red meat supply in Ontario that can be made with the Agriculture Canada forecast of cattle and hog slaughter, one additional procedure and two sets of information were used to forecast the supply of renderable red meat material in Ontario. Forecasts two and three are discussed next.

**(d) Forecast 2**

52. In this, the second, forecast the trend that was observed from 1981 to 1990 in renderable red meat supply for Ontario, Canada and the U.S.A. was extended into the 1991 to 1995 period. This means that the interaction of trends in cattle slaughter, hog slaughter, carcass weights and yields of

renderable products in each of Ontario, Canada and the U.S.A. are extended into the 1991 to 1995 period. Although this procedure can be criticised on the grounds that it simply assumes that historical trends will continue, it is appropriate for several reasons. First, there is little indication that the restructuring of the North American red meat industry that has been occurring in 1980s is going to stop, especially in Canada. The Canadian industry continues to consolidate and increase in geographic concentration. Second, the red meat industry continues to work towards improving its efficiency, both in technical and economic terms. Third, this approach is a substantial improvement over the forecast of renderable red meat supply that can be generated using the Agriculture Canada forecast of cattle and hog slaughter.

**(e) Forecast 3**

53. In this, the third, forecast the trend that was observed from 1981 to 1990 in the slaughter of cattle and hogs for Ontario, Canada and the U.S.A. was extended into the 1991 to 1995 period. To make the approach used in forecast 2 more comparable to forecast 1, and test the robustness of the results to different procedures and assumptions, in this forecast carcass weights were assumed to be constant at their 1990 levels, as were all other technical coefficients in the model. This is identical to the approach used in forecast 1.

**(f) Forecast Results**

54. Table 1 summarizes information on the supply of renderable red meat material from 1971 to 1990 in Ontario, Canada, the U.S.A. and North America and contains the results of the three forecasts discussed in the previous section.

55. The first part of table 1 contains average supplies for several five year periods in each region in thousands of kilograms. The base for the 1991 to 1995 period is equal to the supply in 1990.

56. The second part of table 1 contains the average supply in each region indexed to the base period, which is equal to 1990. The results for forecast 1 for Ontario indicate that Ontario's supply of renderable red meat from 1991 to 1995 is expected to increase marginally less than Canada's: to 1.05 of the base level as compared to 1.06, respectively. The difference results from the slightly higher proportion of beef in Canada's renderable red meat supply. For Canada as a whole 51 percent of the renderable red meat is derived from beef. In Ontario this number is lower -- 49 percent. The results for Ontario for forecasts 2 and 3 indicate that Ontario's renderable red meat supply in the next 5 years is expected to decline to 0.93 (forecast 3) to 0.95 (forecast 2) of the base level. The results for Canada and the U.S.A. indicate that the supply of renderable red meat material in the rest of Canada and in the U.S.A. is expected to be fairly constant over the next 5 years.

57. The third part of table 1 contains the simple average of the year over year changes in renderable red meat supply in each of the regions for each of the five year periods. It simply provides a different way of reporting the information in the second part of the table.

58. The fourth part of table 1 contains Ontario's, Canada's and the U.S.A.'s share of the North American supply of renderable red meat product. The results from all three forecasts indicate that Ontario's share of North American supply is declining. The small decline masks the change in the hog and beef components since they nearly offset each other. As indicated in Appendix 2 the decline for beef is substantial in Ontario in forecasts 2 and 3; 4.0 and 4.8 percent, respectively.

59. The last part of table in indicates the share of renderable red meat material that is derived from beef in each of the five year period in each region. The results for Ontario for forecasts 2 and 3 indicate that this share will continue to decline.

60. Tables 6 to 8 in Appendix 2 provide the same information described in paragraphs 55 to 59 for the beef and pork component of the renderable red meat supply.

**G. Summary and Conclusions**

61. The examination of trends in the North American red meat industry conducted in the first five sections of this report in conjunction with the forecast developed in section 6 indicate that Ontario's renderers have been operating, and will in the future have to operate, in a declining industry. The supply of renderable red meat material will continue to decline in the next five years because of the changes that are more than likely to continue to occur on the supply and demand sides of the red meat market.

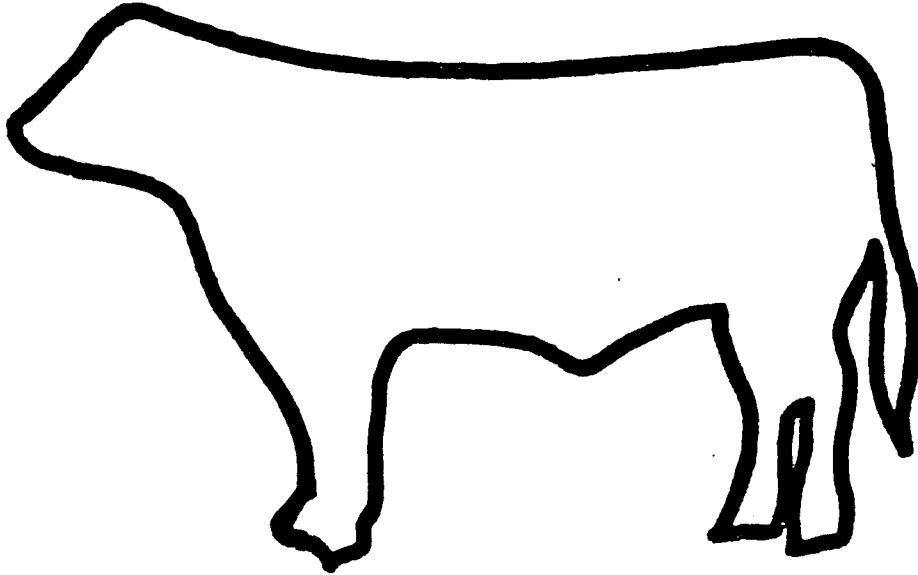
Table 1: RENDERABLE RED MEAT MATERIAL SUPPLY (Base - 1990)

	ONTARIO	CANADA	U.S.A.	NORTH AMERICA
<b>Average (Kilograms)</b>				
1971-1975	274524	887774	9607934	10495708
1976-1980	318111	1015020	9871036	10886056
1981-1985	337138	1107268	9649342	10756610
1986-1990	313570	1112719	9561049	10673768
1991-1995				
Base	288911	1066762	9235652	10302413
Forecast 1	304529	1126597	9874771	11001368
2	273026	1066084	9131888	10197973
3	269663	1060088	9135207	10195295
<b>Indexed to 1990</b>				
1971-1975	0.95	0.83	1.04	1.02
1976-1980	1.10	0.95	1.07	1.06
1981-1985	1.17	1.04	1.04	1.04
1986-1990	1.09	1.04	1.04	1.04
1991-1995				
Base	1.00	1.00	1.00	1.00
Forecast 1	1.05	1.06	1.07	1.07
2	0.95	1.00	0.99	0.99
3	0.93	0.99	0.99	0.99
<b>Average Year Over Year Change (%)</b>				
1971-1975	-0.0	1.6	-0.1	0.0
1976-1980	4.0	2.6	0.1	0.3
1981-1985	-0.9	1.1	0.4	0.5
1986-1990	-2.4	-1.2	-1.2	-1.2
1991-1995				
Base	0.0	0.0	0.0	0.0
Forecast 1	1.7	1.8	2.3	2.3
2	-1.9	-0.0	-0.4	-0.3
3	-2.4	-0.2	-0.4	-0.4
<b>Share of North America</b>				
1971-1975	2.6	8.5	91.5	100.0
1976-1980	2.9	9.3	90.7	100.0
1981-1985	3.1	10.3	89.7	100.0
1986-1990	2.9	10.4	89.6	100.0
1991-1995				
Base	2.8	10.4	89.6	100.0
Forecast 1	2.7	10.2	89.8	100.0
2	2.7	10.5	89.5	100.0
3	2.6	10.4	89.6	100.0
<b>Percent from Beef</b>				
1971-1975	62	62	64	64
1976-1980	62	63	67	67
1981-1985	54	55	66	65
1986-1990	51	51	66	65
1991-1995				
Base	47	49	65	63
Forecast 1	49	51	67	65
2	44	48	66	64
3	44	48	66	64



**Appendix 1****Figures Referred to in the Text of the Report**

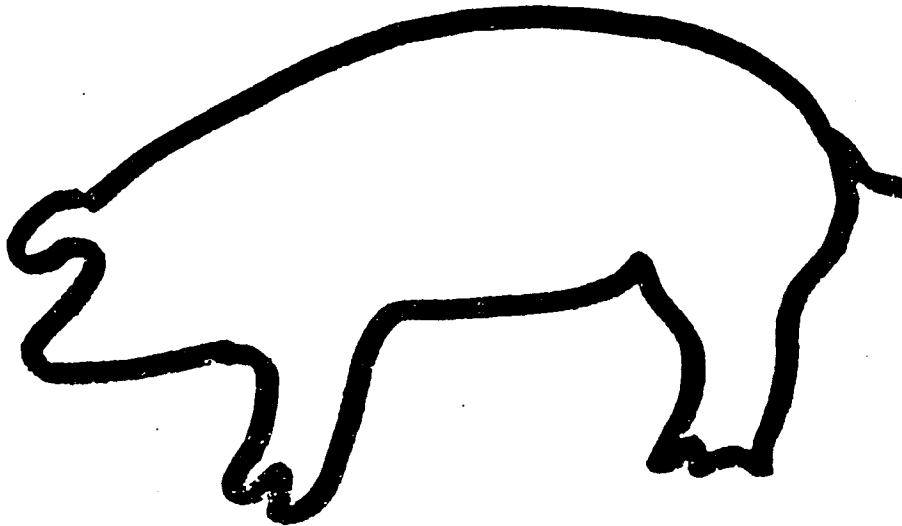
**Figure 1: Weight and Value of a Beef Carcass (Based on a 1200 lb. Steer;  
Slaughterhouse Shipping Door)**



<u>PRODUCT</u>	<u>WEIGHT (LB.)</u>	<u>VALUE (\$)</u>
Dressed Meat	698	\$1,110.00
Hide (Green)	87	53.00
Fancy Meats (Glands)	47	18.50
Pet Food Products	21	2.10
Edible Fat	42	2.58
Inedible Rendering	205	12.58
Blood	50	n.v.
Manure	50	n.v.
	<u>1,200</u>	<u>\$1,198.76</u>

NOTE: These weights and values are estimates only and are subject to variation by animal and day.

**Figure 2: Weight and Value of a Pork Carcass (Based on a 220 lb. Hog; Slaughterhouse Shipping Door)**



<u>PRODUCT</u>	<u>WEIGHT (LB.)</u>	<u>VALUE (\$)</u>
Dressed Meat	149.0	\$146.76
Edible Fat & Bones	21.0	1.96
Pet Food Products	3.5	0.22
Fancy Meats (Glands)	4.5	4.80
Rinds or Skins	4.5	0.75
Inedible Rendering (includes blood)	<u>37.5</u>	<u>0.51</u>
	<u>220.0</u>	<u>\$155.00</u>

**NOTE:** Manure excluded from weight.  
 : These weights and values are estimates only and are subject to variation by animal and day.

Figure 3: Annual Per Capita Consumption of Poultry and Red Meat in Canada and the U.S., 1970-1989, Kilograms

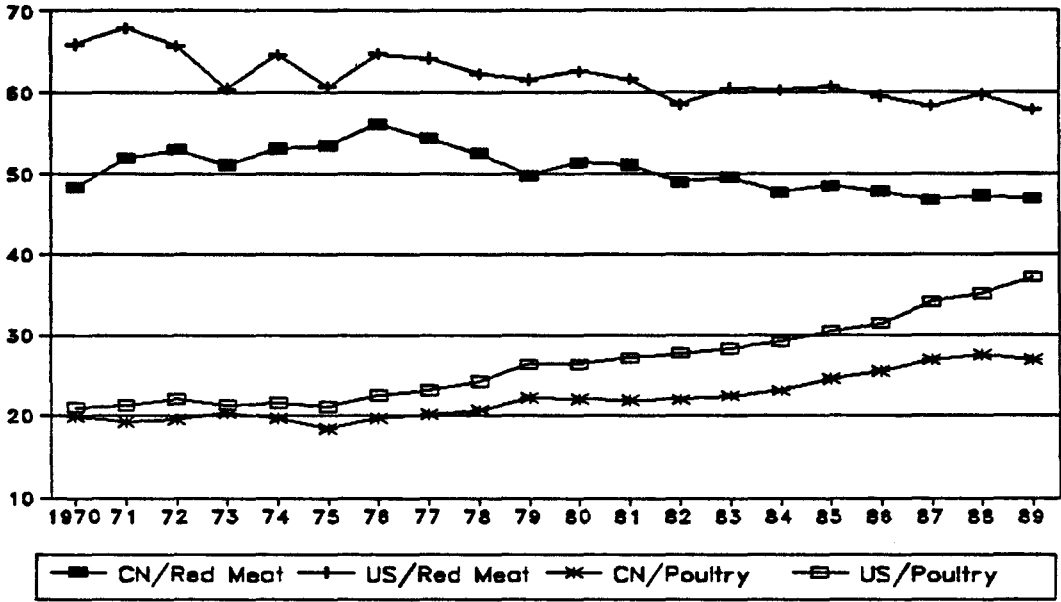


Figure 4: Annual Per Capita Consumption and Relative Price Index for Pork in the U.S., 1970-1989 (Kilograms, 1988 = 0)

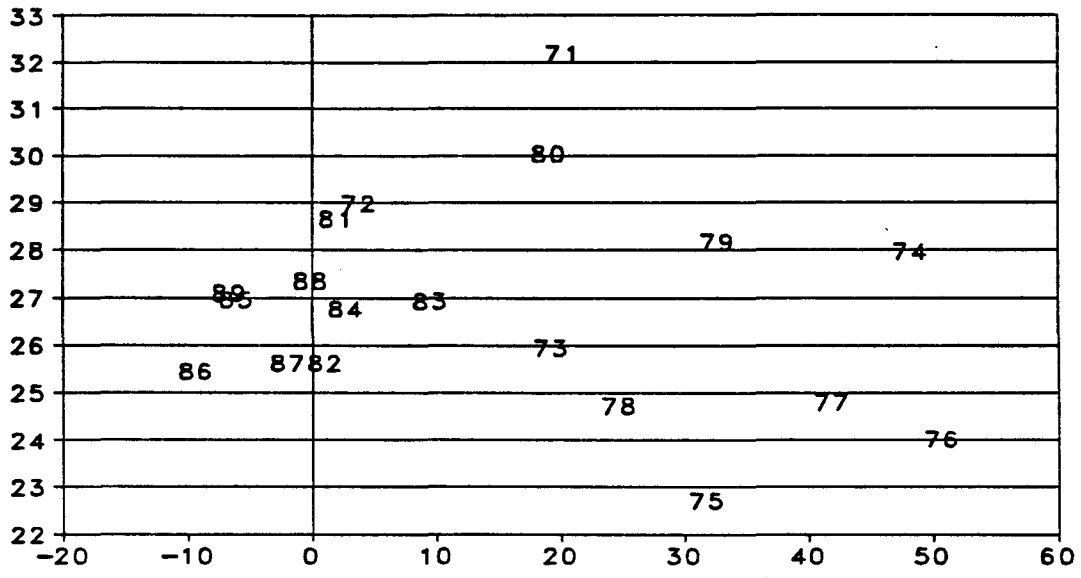


Figure 5: Annual Per Capita Consumption and Relative Price Index for Pork in Canada, 1970-1989 (Kilograms, 1988 = 0)

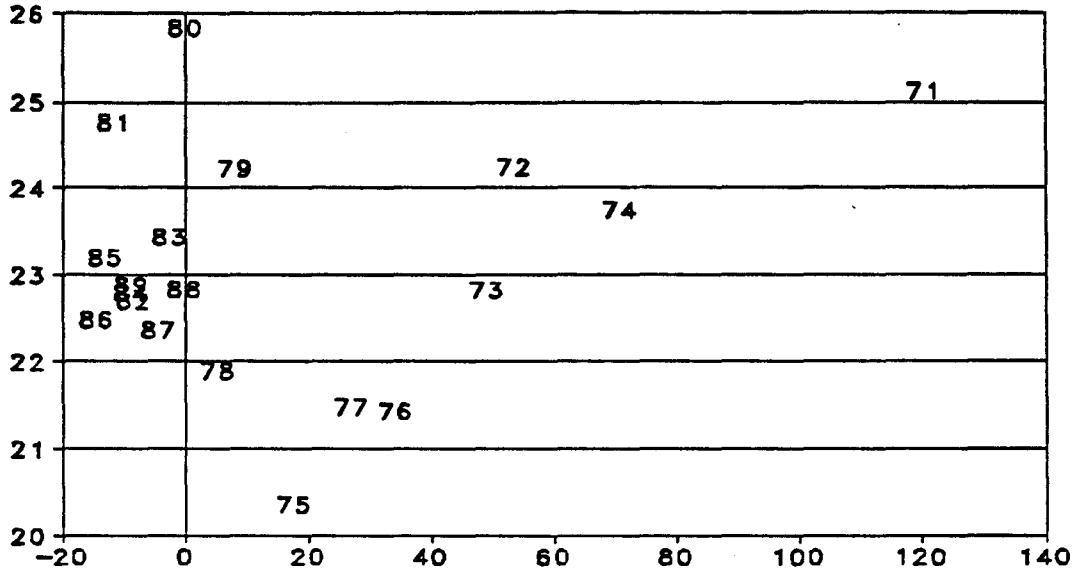


Figure 6: Annual Per Capita Consumption and Relative Price Index for Beef in the U.S., 1970-1989 (Kilograms, 1988 = 0)

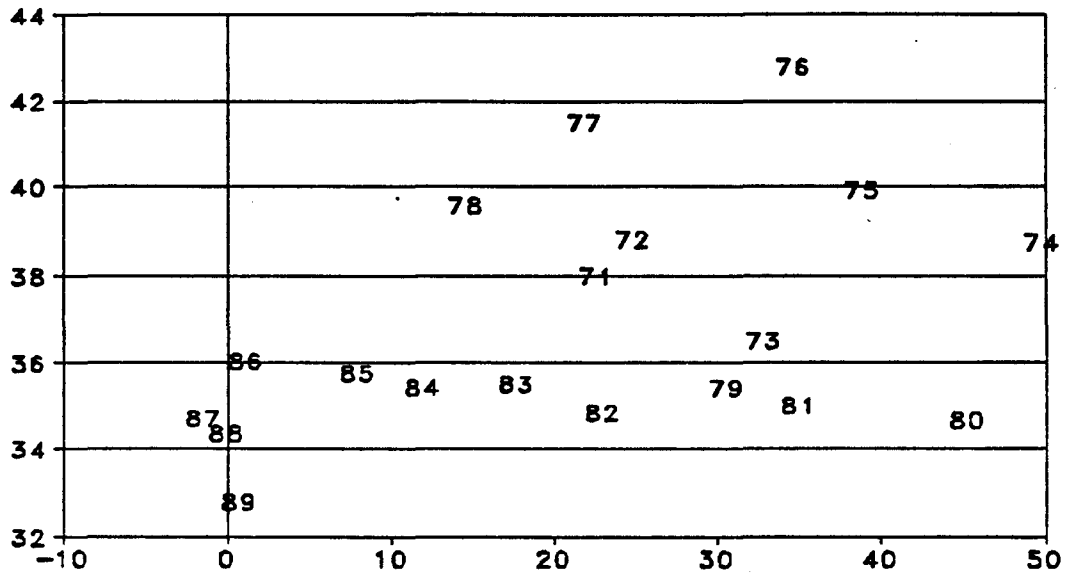


Figure 7: Annual Per Capita Consumption and Relative Price Index for Beef in Canada, 1970-1989 (Kilograms, 1988 = 0)

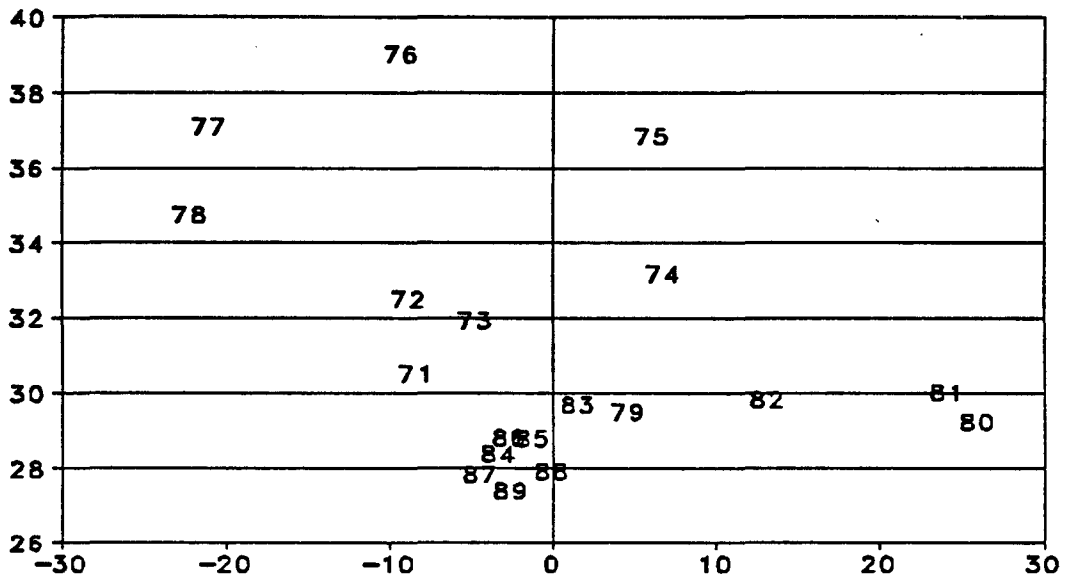




Figure 8: Changes in Geographic Concentration of Beef Slaughter in North America, 1980 to 1990

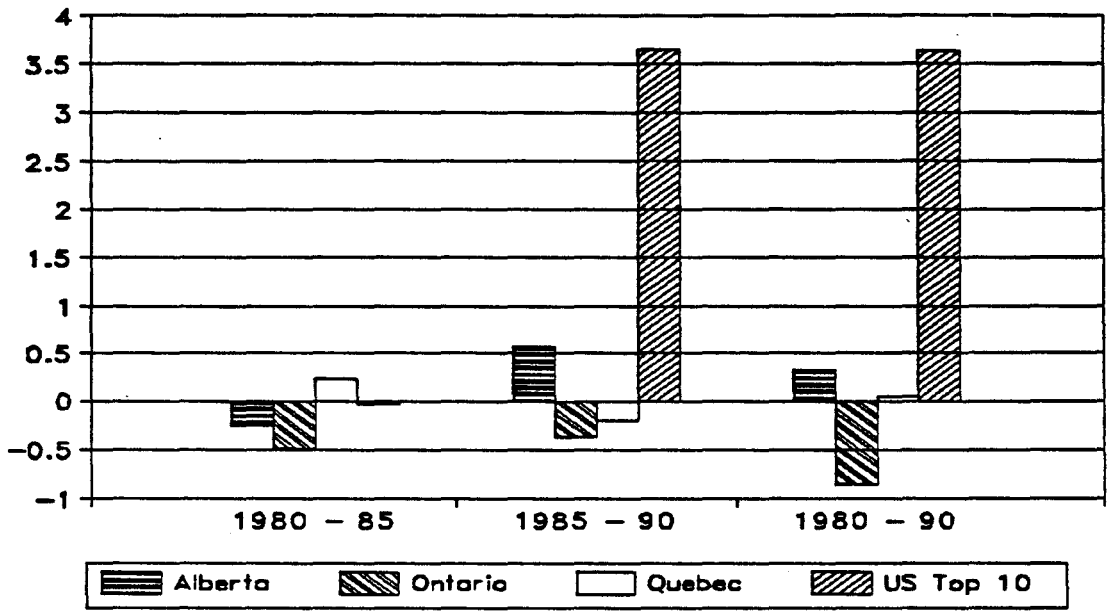


Figure 9: Changes in Geographic Concentration of Hog Slaughter in North America, 1980 to 1990

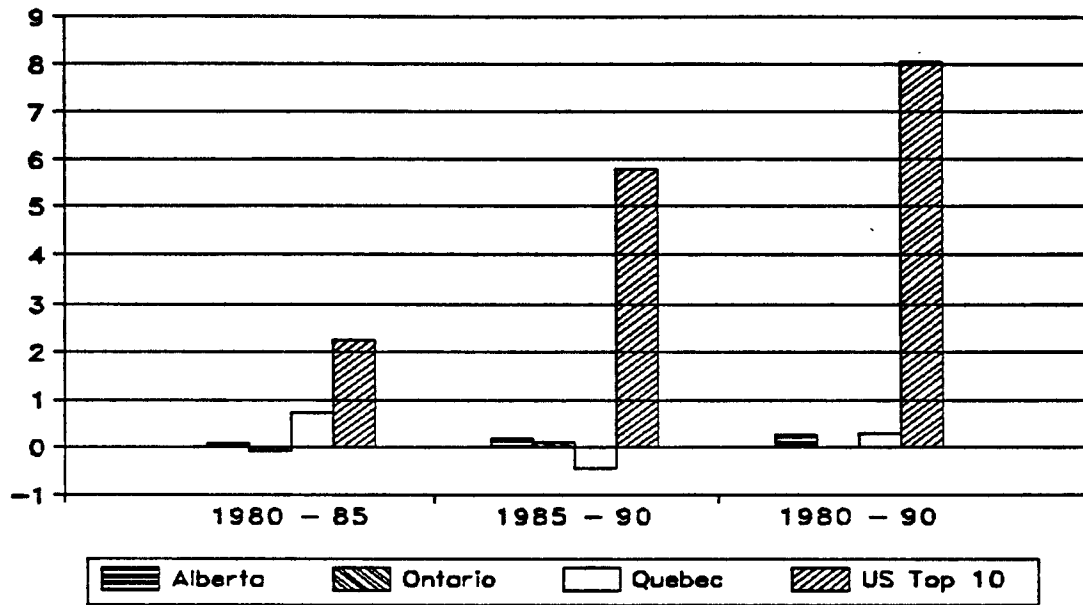


Figure 10: Proportion of Cattle and Hog Slaughter Conducted by the Top Four Firms in the U.S., 1975 - 1989

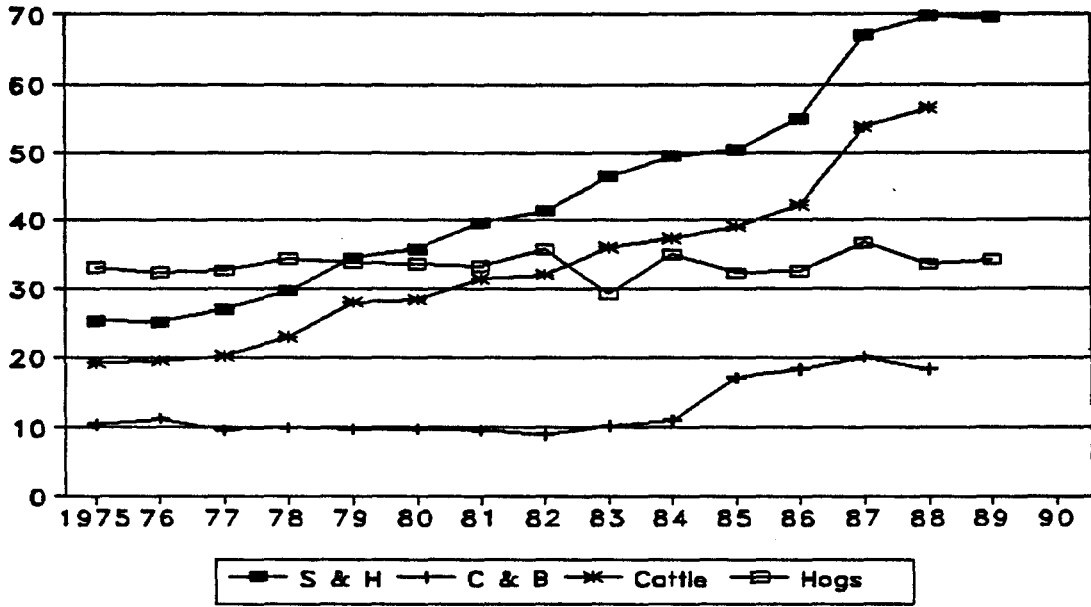


Figure 11: Beef and Pork Production per Plant in Ontario, Canada, the U.S., 1970-1988, Millions of Pounds

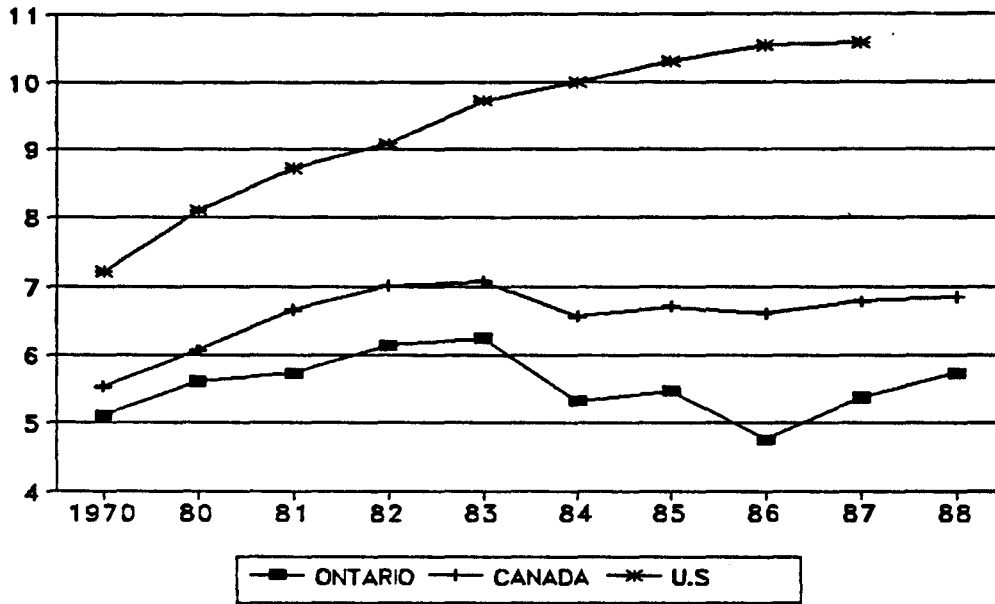


Figure 12: Beef and Pork Production per Production Worker in Ontario, Canada, the U.S., 1970-1988, Thousands of Pounds

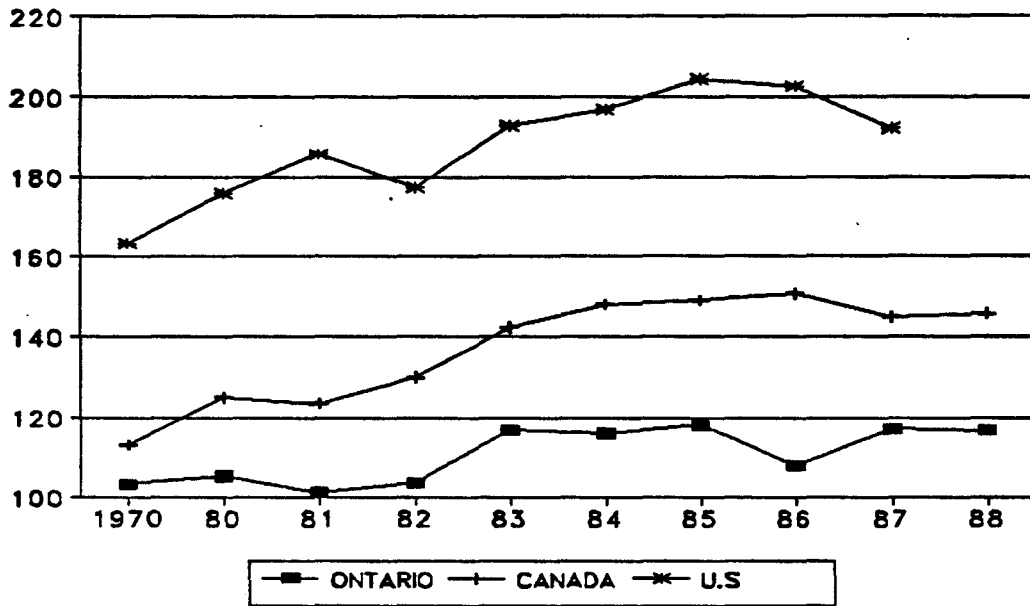


Figure 13: Value Added as a Percentage of Sales in the Red Meat Industry in Ontario, Canada and the U.S., 1970 to 1988

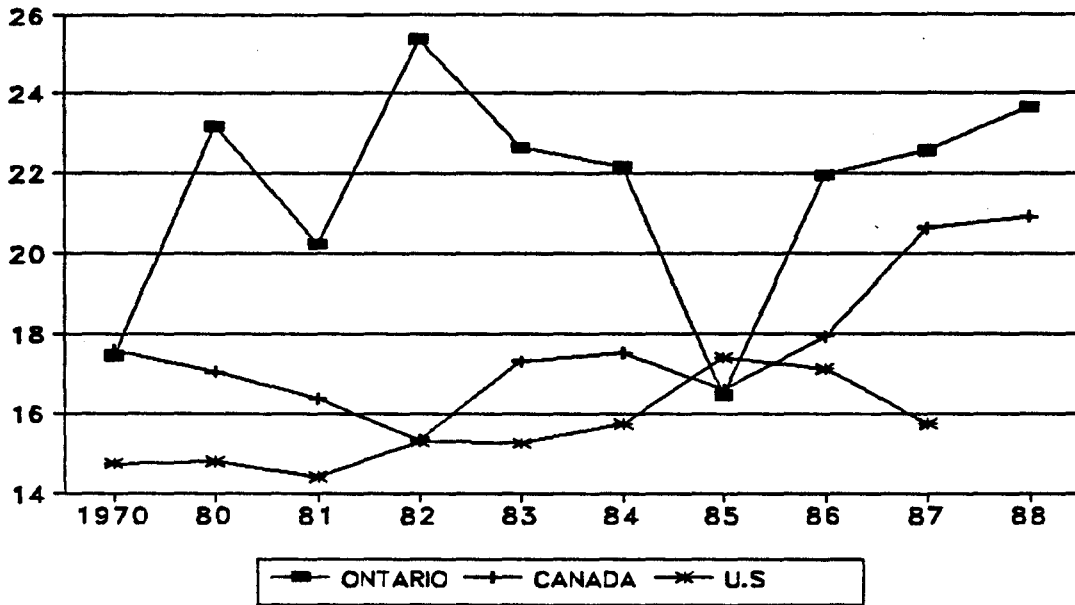


Figure 14: Value Added per Production Worker in the Red Meat Industry in Ontario, Canada and the U.S., 1970 to 1988, (C\$ 000)

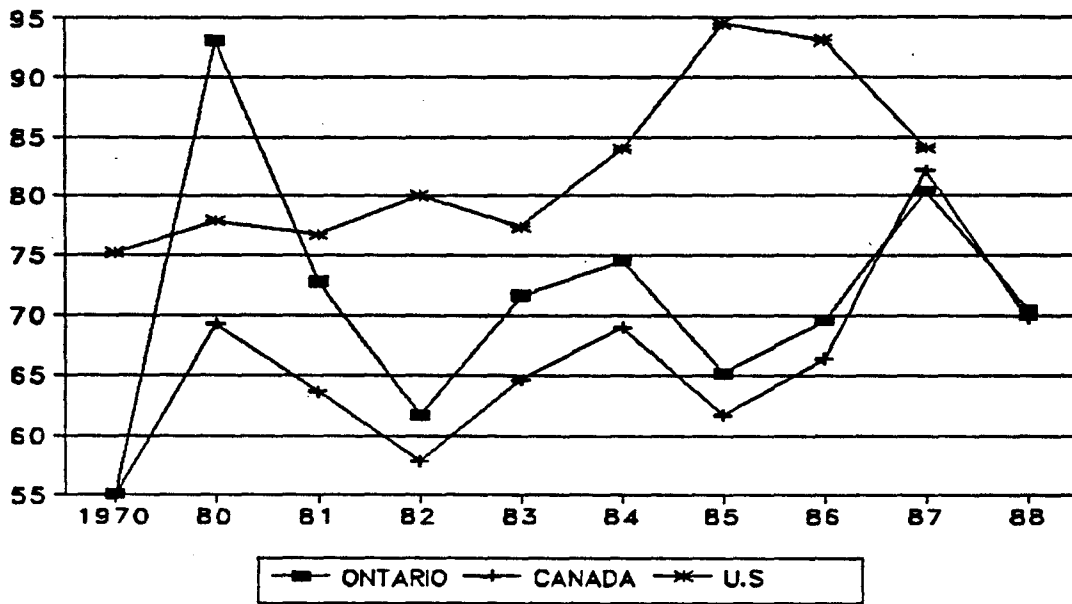


Figure 15: Value Added as a Ratio of the Production Wage Bill in the Red Meat Industry in Ontario, Canada and the U.S., 1970 to 1988

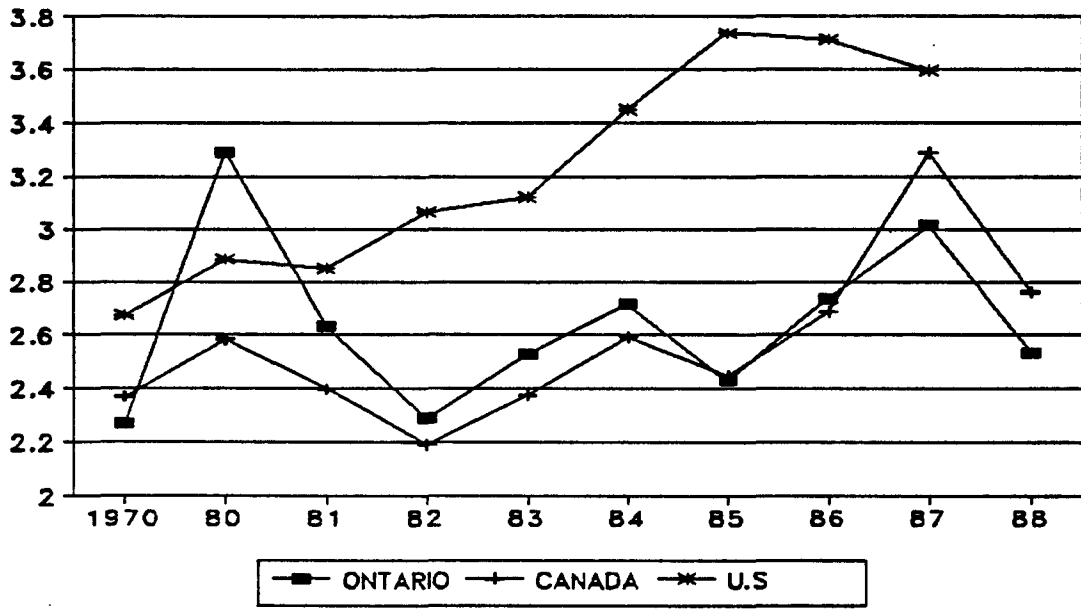




Figure 16: Value Added per Plant in the Red Meat Industry in Ontario, Canada and the U.S., 1970 to 1988, (C\$ Million)

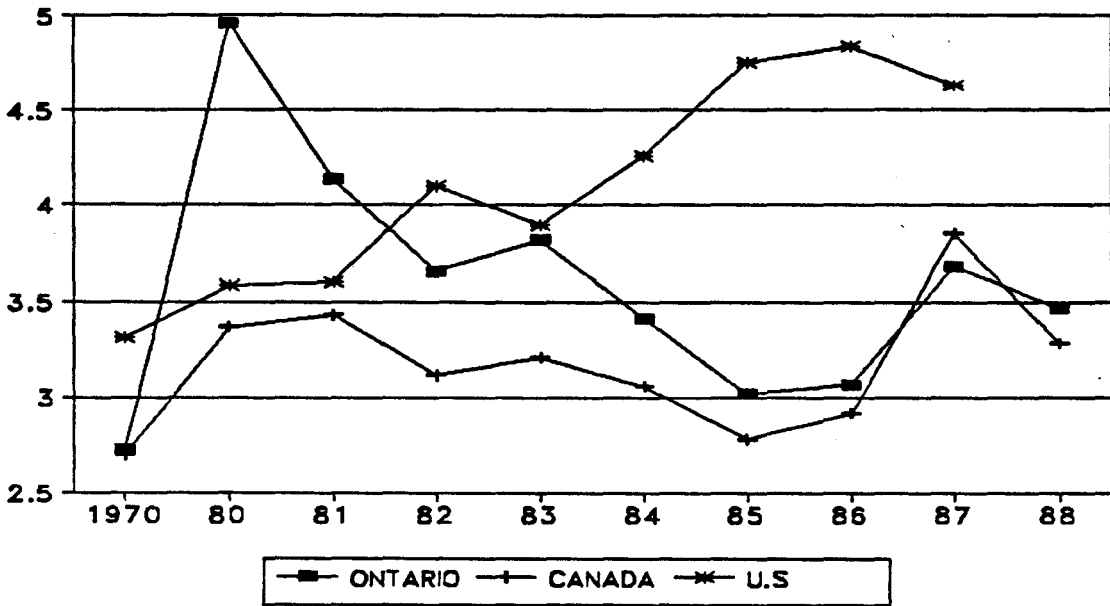


Figure 17: Ontario and Canadian Percent Shares of Sales by the North American Red Meat Industry, 1970 to 1988

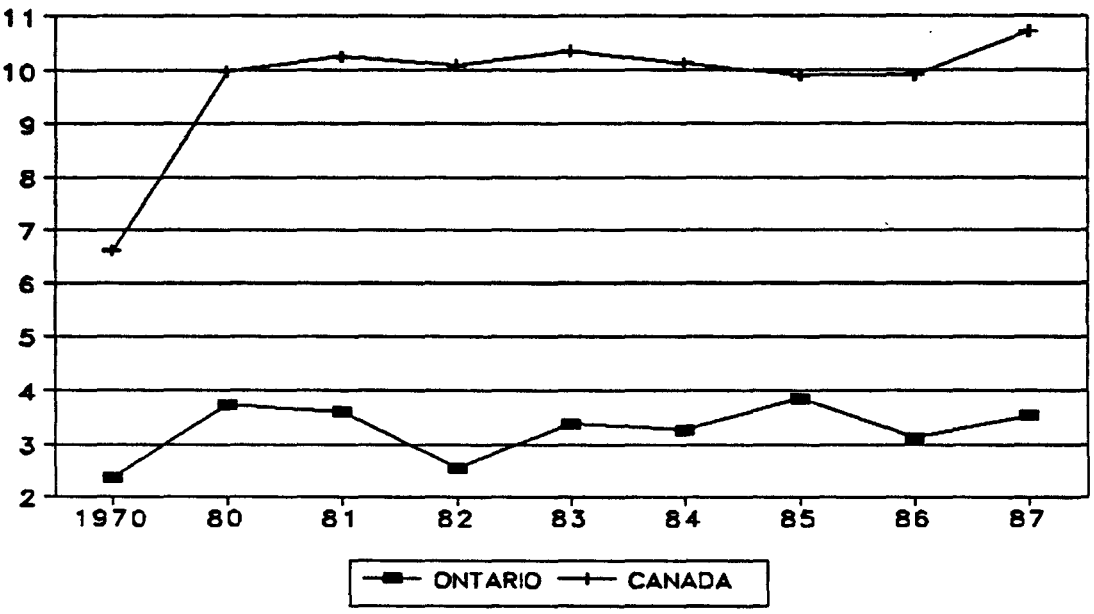
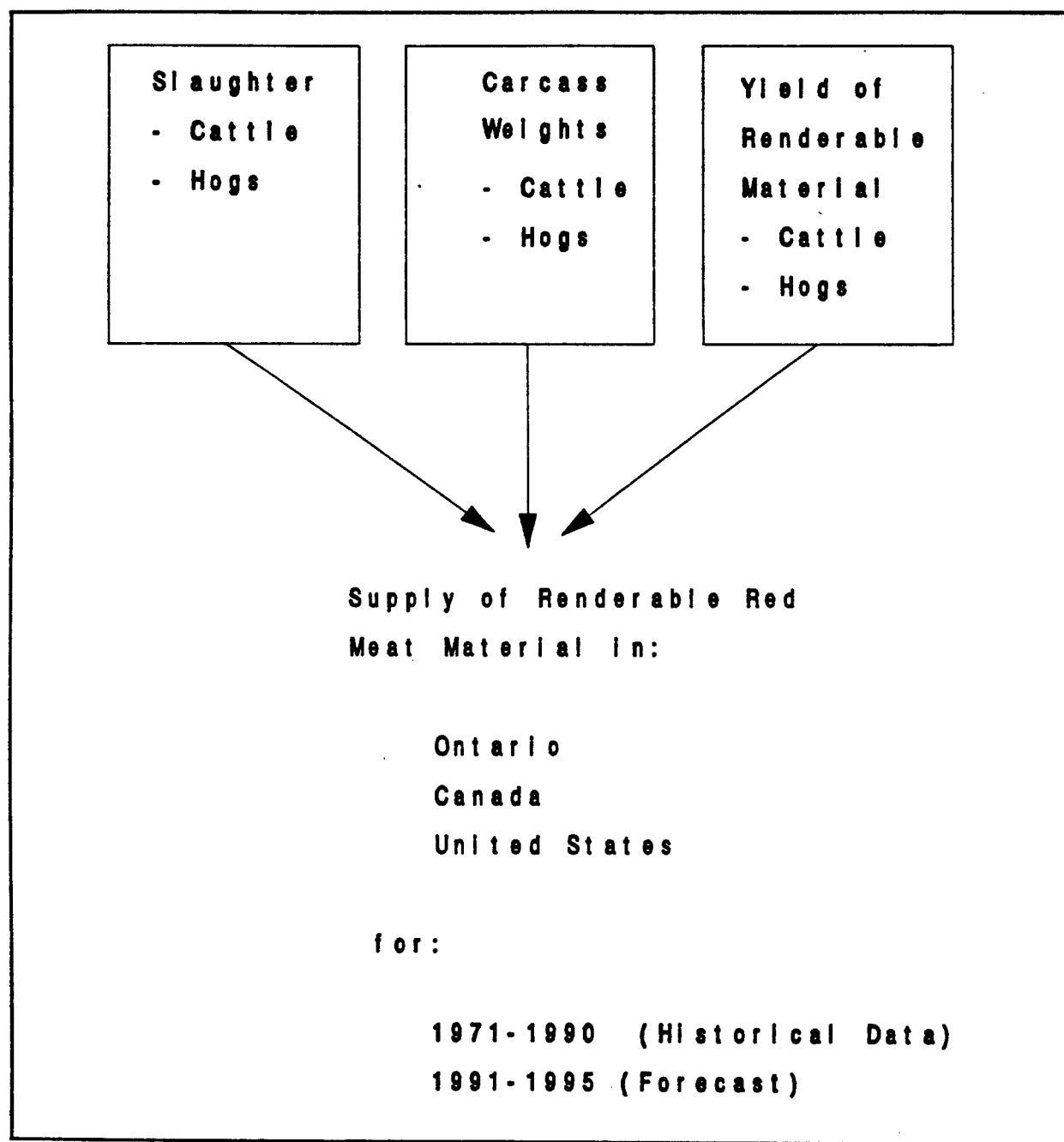


Figure 18: Overview of a Model to Estimate the Renderable Red Meat Supply in Ontario, Canada, the U.S. and North America



## Appendix 2 - Table 1: Livestock Carcass Weights (lbs.)

CATTLE - TOTAL	ONTARIO	CANADA	U.S.A.
1970	583	573	624
1971	582	569	619
1972	586	572	629
1973	581	573	634
1974	574	563	630
1975	565	550	588
1976	574	560	610
1977	575	563	605
1978	593	578	614
1979	612	603	639
1980	611	601	643
1981	614	598	644
1982	609	587	631
1983	626	604	636
1984	621	600	630
1985	636	614	656
1986	645	623	656
1987	650	635	662
1988	673	653	671
1989	668	647	689
1990	682	659	684
HOGS			
1970	165	165	187
1971	165	164	185
1972	165	164	186
1973	165	164	188
1974	166	165	191
1975	165	164	186
1976	165	165	187
1977	165	164	170
1978	170	171	171
1979	169	170	172
1980	168	170	172
1981	169	170	173
1982	170	171	173
1983	172	172	173
1984	171	172	174
1985	171	173	175
1986	172	174	177
1987	173	175	177
1988	172	175	178
1989	173	175	178
1990	176	175	180

Source: Agriculture Canada and U.S. Department of Agriculture

## Appendix 2 - Table 2: Slaughter of Cattle and Hogs, 1970-1990

TOTAL CATTLE	ONTARIO	CANADA	U.S.A.
1970	985537	3218092	33816000
1971	999220	3235168	34225000
1972	991307	3158310	34690000
1973	937511	3022428	32329000
1974	1014640	3343569	35674000
1975	1159775	4116965	40801000
1976	1216723	4440686	43430000
1977	1329182	4613626	43414000
1978	1247339	4061625	40568000
1979	1078992	3370414	34001000
1980	1098543	3464097	33947000
1981	1080912	3528802	35297000
1982	1107956	3775481	36635000
1983	1122682	3850358	37615000
1984	1058809	3812479	38910000
1985	1031377	3749167	37933000
1986	1086606	3680163	39108000
1987	954323	3371569	37148000
1988	901713	3283278	36401000
1989	859811	3340031	35155000
1990	771972	3101928	34090500
<b>HOGS</b>			
1970	2933184	8648250	78187000
1971	3141090	10113481	86667000
1972	2927908	9357143	78759000
1973	2748385	9041220	72264000
1974	2767988	9269491	77071000
1975	2491263	7913149	64926000
1976	2549727	7679387	70454000
1977	2630320	8166580	74019000
1978	3025588	9084950	74139000
1979	3775958	11236123	85425000
1980	4191697	13151109	91882000
1981	4060090	13045732	87851000
1982	4194775	12886106	79328000
1983	4347482	13116522	84762000
1984	4036633	13254165	82478000
1985	4058745	13679964	81974000
1986	3181868	13835364	77290000
1987	4380829	14220695	78913000
1988	4630273	14875606	85354000
1989	4362251	14898961	86272000
1990	4015983	14185549	82648000

Source: Agriculture Canada and U.S. Department of Agriculture

Appendix 2 - Table 3: Yield Factors - Renderable Red Meat Material as a Percent of Cattle and Hog Carcasses

CATTLE

	ONTARIO	CANADA	U.S.A.
1970	64%	64%	62%
1971	64%	64%	62%
1972	64%	64%	62%
1973	63%	63%	62%
1974	63%	63%	61%
1975	63%	63%	61%
1976	62%	62%	61%
1977	62%	62%	60%
1978	61%	61%	60%
1979	61%	61%	60%
1980	61%	61%	60%
1981	60%	60%	59%
1982	60%	60%	59%
1983	60%	60%	59%
1984	59%	59%	59%
1985	59%	59%	58%
1986	58%	58%	58%
1987	58%	58%	58%
1988	58%	58%	57%
1989	57%	57%	57%
1990	57%	57%	57%

HOGS

1970	50%	50%	55%
1971	50%	50%	55%
1972	50%	50%	54%
1973	50%	50%	54%
1974	50%	50%	53%
1975	50%	50%	53%
1976	50%	50%	53%
1977	50%	50%	52%
1978	49%	49%	52%
1979	49%	49%	52%
1980	49%	49%	51%
1981	49%	49%	51%
1982	49%	49%	51%
1983	49%	49%	50%
1984	49%	49%	50%
1985	48%	48%	50%
1986	48%	48%	49%
1987	48%	48%	49%
1988	48%	48%	48%
1989	48%	48%	48%
1990	48%	48%	48%

Appendix 2 - Table 4: Proportions of Livestock Carcasses that are Renderable (Calculation for 1990)

Cattle (Steer)-----			Hog-----		
Live Weight	1150	1200	LEVELS: Live Weight	230	235
Renderable (Fat & Bone)	146	153	Renderable (Fat, Bone, Skin)	32	33
Round	32	33	Ham	10	11
Loin	27	28	Loin	2	2
Rib	8	9	Side	2	2
Chuck	31	33	Boston-Butt	0	0
Thin Cuts	20	21	Picnic	3	3
Miscellaneous and Breaking Fat	28	29	Miscellaneous and Fat, Skin and Bone	15	15
Retail	568	592	Retail	136	139
Round	124	129	Ham	29	30
Loin	89	93	Loin	30	30
Rib	57	60	Side	35	35
Chuck	178	186	Boston-Butt	12	12
Thin Cuts	115	119	Picnic	13	13
Miscellaneous	5	5	Miscellaneous	18	18
Total Carcass Weight	714	745	Total Carcass Weight	168	172
Round	156	163	Ham	40	41
Loin	116	121	Loin	31	32
Rib	66	69	Side	37	37
Chuck	210	219	Boston-Butt	12	12
Thin Cuts	135	140	Picnic	16	16
Miscellaneous and Breaking Fat	33	34	Miscellaneous and Fat, Skin and Bone	33	33
Residual	436	455	Residual	62	63
Hide	84	87	Hair	2	2
Manure	48	50	Manure	7	7
Fancy Meats	45	47	Fancy Meats	5	4
Renderable Total	405	424	Renderable Total	80	82
Yield Factors: Total Renderable / Carcass Weight	57%	57%	Yield Factors: Total Renderable / Carcass Weight	48%	48%
Renderable as Percent of Carcass Cuts	20%	20%	Renderable as Percent of Carcass Cuts	19%	19%
Round	21%	21%	Round	26%	26%
Loin	23%	23%	Loin	5%	5%
Rib	13%	13%	Rib	5%	5%
Chuck	15%	15%	Chuck	0%	0%
Thin Cuts	15%	15%	Thin Cuts	21%	21%
Miscellaneous	85%	85%	Miscellaneous	45%	45%
Retail / Carcass	79.5%	79.5%	Retail / Carcass	80.9%	80.9%
Retail / Live	49.4%	49.4%	Retail / Live	59.2%	59.2%

Sources: Based on Information provided by the American Meat Institute, Maple Leaf Foods and the Canadian Meat Council

Appendix 2 - Table 5: Renderable Red Meat Supply (Base Run)

KGs	ONTARIO	CANADA	U.S.A.	NORTH AMERICA
1970	278768	866191	9604784	10470974
1971	287221	914530	9931454	10845983
1972	277565	871720	9713134	10584853
1973	259250	834416	9031730	9866146
1974	269847	882662	9810486	10693148
1975	278739	935542	9552869	10488410
1976	291586	985510	10445407	11430917
1977	311222	1029158	10191446	11220604
1978	320999	1002324	9790231	10792554
1979	324888	989089	9346566	10335655
1980	341860	1069020	9581530	10650550
1981	334016	1069384	9631741	10701124
1982	341038	1091474	9343381	10434854
1983	354947	1126659	9721545	10848204
1984	328385	1116678	9753677	10870354
1985	327305	1132147	9796370	10928516
1986	305278	1135302	9796177	10931479
1987	328376	1105696	9527467	10633162
1988	332151	1129061	9700059	10829120
1989	313134	1126776	9545890	10672665
1990	288911	1066762	9235652	10302413

## Percent Derived from Beef:

1970	60	62	62	62
1971	59	59	60	60
1972	60	60	63	63
1973	60	60	63	63
1974	62	61	64	63
1975	67	69	69	69
1976	68	71	70	70
1977	69	71	71	71
1978	64	65	69	69
1979	56	57	63	63
1980	54	54	62	61
1981	54	54	64	63
1982	54	55	66	65
1983	53	56	66	65
1984	54	55	67	65
1985	53	54	67	66
1986	61	53	69	67
1987	50	51	68	66
1988	48	50	66	64
1989	48	50	65	63
1990	47	49	65	63



Appendix 2 - Table 6: Forecast 1 - RENDERABLE RED MEAT MATERIAL SUPPLY

TOTAL CATTLE	ONTARIO	CANADA	U.S.A.	NORTH AMERICA
<b>Average</b>				
1971-1975	169003	546849	6138411	6685260
1976-1980	196877	643507	6619708	7263215
1981-1985	181089	606466	6353246	6959711
1986-1990	158385	563810	6348486	6912296
1991-1995	149198	579301	6604094	7183395
<b>Indexed to 1990</b>				
1971-1975	2.74	1.04	1.02	1.02
1976-1980	1.45	1.22	1.10	1.11
1981-1985	1.33	1.15	1.06	1.06
1986-1990	1.17	1.07	1.06	1.06
1991-1995	1.10	1.10	1.10	1.10
<b>Average Year Over Year Change (%)</b>				
1971-1975	2.1	3.8	2.2	2.3
1976-1980	-0.1	-2.2	-2.2	-2.2
1981-1985	-1.1	1.3	2.1	2.0
1986-1990	-4.9	-3.0	-1.8	-1.9
1991-1995	3.5	3.5	3.5	3.5
<b>Share of North America</b>				
1971-1975	2.5	8.2	91.8	100.0
1976-1980	2.7	8.9	91.1	100.0
1981-1985	2.6	8.7	91.3	100.0
1986-1990	2.3	8.2	91.8	100.0
1991-1995	2.1	8.1	91.9	100.0
<b>HOGS</b>				
<b>Average</b>				
1971-1975	105522	340925	3469525	3810450
1976-1980	121234	371513	3251329	3622842
1981-1985	156049	500803	3296098	3796900
1986-1990	155185	548909	3212564	3761473
1991-1995	155331	547296	3270678	3817973
<b>Indexed to 1990</b>				
1971-1975	0.69	0.63	1.08	1.01
1976-1980	0.79	0.69	1.01	0.96
1981-1985	1.02	0.93	1.02	1.01
1986-1990	1.01	1.02	1.00	1.00
1991-1995	1.01	1.01	1.01	1.01
<b>Average Year Over Year Change (%)</b>				
1971-1975	-3.4	-2.0	-4.1	-4.0
1976-1980	10.6	11.0	4.7	5.3
1981-1985	-0.6	0.9	-2.8	-2.3
1986-1990	0.1	0.7	-0.0	0.1
1991-1995	-0.0	-0.0	-0.0	-0.0
<b>Share of North America</b>				
1971-1975	2.8	8.9	91.1	100.0
1976-1980	3.3	10.3	89.7	100.0
1981-1985	4.1	13.2	86.8	100.0
1986-1990	4.1	14.6	85.4	100.0
1991-1995	4.1	14.3	85.7	100.0

Appendix 2 - Table 7: Forecast 2 - RENDERABLE RED MEAT MATERIAL SUPPLY

TOTAL CATTLE	ONTARIO	CANADA	U.S.A.	NORTH AMERICA
<b>Average</b>				
1971-1975	169003	546849	6138411	6685259
1976-1980	196877	643507	6619708	7263215
1981-1985	181089	606465	6353245	6959711
1986-1990	158385	563810	6348486	6912295
1991-1995	121163	513954	6045449	6559403
<b>Indexed to 1990</b>				
1971-1975	2.74	1.04	1.02	1.02
1976-1980	1.45	1.22	1.10	1.11
1981-1985	1.33	1.15	1.06	1.06
1986-1990	1.17	1.07	1.06	1.06
1991-1995	0.89	0.97	1.01	1.00
<b>Average Year Over Year Change (%)</b>				
1971-1975	2.1	3.8	2.2	2.3
1976-1980	-0.1	-2.2	-2.2	-2.2
1981-1985	-1.1	1.3	2.1	2.0
1986-1990	-4.9	-3.0	-1.8	-1.9
1991-1995	-4.0	-0.9	0.2	0.1
<b>Share of North America</b>				
1971-1975	2.5	8.2	91.8	100.0
1976-1980	2.7	8.9	91.1	100.0
1981-1985	2.6	8.7	91.3	100.0
1986-1990	2.3	8.2	91.8	100.0
1991-1995	1.8	7.8	92.2	100.0
<b>HOGS</b>				
<b>Average</b>				
1971-1975	105522	340925	3469524	3810450
1976-1980	121234	371513	3251328	3622842
1981-1985	156049	500803	3296098	3796900
1986-1990	155185	548909	3212564	3761473
1991-1995	151863	552130	3086440	3638570
<b>Indexed to 1990</b>				
1971-1975	0.69	0.63	1.08	1.01
1976-1980	0.79	0.69	1.01	0.96
1981-1985	1.02	0.93	1.02	1.01
1986-1990	1.01	1.02	1.00	1.00
1991-1995	0.99	1.02	0.96	0.97
<b>Average Year Over Year Change (%)</b>				
1971-1975	-3.4	-2.0	-4.1	-4.0
1976-1980	10.6	11.0	4.7	5.3
1981-1985	-0.6	0.9	-2.8	-2.3
1986-1990	0.1	0.7	-0.0	0.1
1991-1995	-0.3	0.8	-1.5	-1.1
<b>Share of North America</b>				
1971-1975	2.8	8.9	91.1	100.0
1976-1980	3.3	10.3	89.7	100.0
1981-1985	4.1	13.2	86.8	100.0
1986-1990	4.1	14.6	85.4	100.0
1991-1995	4.2	15.2	84.8	100.0

Appendix 2 - Table 8: Forecast 3 - RENDERABLE RED MEAT MATERIAL SUPPLY

TOTAL CATTLE	ONTARIO	CANADA	U.S.A.	NORTH AMERICA
<b>Average</b>				
1971-1975	169003	546849	6138411	6685260
1976-1980	196877	643507	6619708	7263215
1981-1985	181089	606466	6353246	6959711
1986-1990	158385	563810	6348486	6912296
1991-1995	118592	508922	6019950	6528872
<b>Indexed to 1990</b>				
1971-1975	2.74	1.04	1.02	1.02
1976-1980	1.45	1.22	1.10	1.11
1981-1985	1.33	1.15	1.06	1.06
1986-1990	1.17	1.07	1.06	1.06
1991-1995	0.87	0.96	1.00	1.00
<b>Average Year Over Year Change (%)</b>				
1971-1975	2.1	3.8	2.2	2.3
1976-1980	-0.1	-2.2	-2.2	-2.2
1981-1985	-1.1	1.3	2.1	2.0
1986-1990	-4.9	-3.0	-1.8	-1.9
1991-1995	-4.8	-1.2	0.0	-0.1
<b>Share of North America</b>				
1971-1975	2.5	8.2	91.8	100.0
1976-1980	2.7	8.9	91.1	100.0
1981-1985	2.6	8.7	91.3	100.0
1986-1990	2.3	8.2	91.8	100.0
1991-1995	1.8	7.8	92.2	100.0
<b>HOGS</b>				
<b>Average</b>				
1971-1975	105522	340925	3469525	3810450
1976-1980	121234	371513	3251329	3622842
1981-1985	156049	500803	3296098	3796900
1986-1990	155185	548909	3212564	3761473
1991-1995	151071	551166	3115257	3666423
<b>Indexed to 1990</b>				
1971-1975	0.69	0.63	1.08	1.01
1976-1980	0.79	0.69	1.01	0.96
1981-1985	1.02	0.93	1.02	1.01
1986-1990	1.01	1.02	1.00	1.00
1991-1995	0.99	1.02	0.97	0.97
<b>Average Year Over Year Change (%)</b>				
1971-1975	-3.4	-2.0	-4.1	-4.0
1976-1980	10.6	11.0	4.7	5.3
1981-1985	-0.6	0.9	-2.8	-2.3
1986-1990	0.1	0.7	-0.0	0.1
1991-1995	-0.4	0.7	-1.2	-0.9
<b>Share of North America</b>				
1971-1975	2.8	8.9	91.1	100.0
1976-1980	3.3	10.3	89.7	100.0
1981-1985	4.1	13.2	86.8	100.0
1986-1990	4.1	14.6	85.4	100.0
1991-1995	4.1	15.0	85.0	100.0

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