VARIABILITY IN ESTIMATING WEEKLY GROSS MARGINS IN MEAT PACKING FOR BEEF, PORK, AND LAMB

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December, 1993

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
MASTER OF SCIENCE
December, 1995

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Thesis Approved:

Thesis Advisor

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ACKNOWLEDGMENTS

First, I would like to thank Dr. James Osborne and the Department of Agricultural Economics for the opportunity to be involved in this program. I would like to thank the faculty and staff for education and assistance throughout my undergraduate and graduate school experience.

Second, I want to thank Dr. Derrell Peel for his guidance, assistance, and patience during the past two years. Without his help, I would not have been able to achieve my educational goals. I would also like to thank Dr. Clement Ward and Dr. Stephen Koontz for their suggestions and serving on my committee.

Third, I would like to thank my friends and fellow graduate students who have helped me through graduate school. I would especially like to thank Kendall, Barry, and Keith for their golf outings and stress relief, and Genelle for all of her help.

Fourth, I want to thank my family. To my dad and mom, Charles and Peggy Sweatt, thanks for all of the love and support. Thanks to my grandmother, Lucille, who always told me that I could do it. Without the support of all of my family, I do not think I could have made it.

Finally, I would like to thank my best friend Casie. Thank you for always being there for me. When I needed encouragement, support, and advise, you were there for me. I will never forget you. But, most of all, I would like to thank God for the ability and strength to make this dream come true.

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CHAPTER 1

INTRODUCTION

1.1 Meat Packing Industry Changes and Issues

Considerable structural change has occured within the meat packing industry in recent years. This leads to continuing concerns of oligopoly pricing in the industry. The structure has gone from many, smaller meat packers to fewer, larger meat packers. Although less extensive, the cattle feeding industry has also experienced increased concentration. Simultaneously, a variety of forms of vertical integration are increasingly common between cattle feeding and beef packing entities. In some cases, packing and feeding operations are under a common ownership umbrella. Examples include Conagra's ownership of Monfort packing and feeding entities and Cargill's ownership of Excel packing and Caprock Industries. Firms linked in this manner exhibit a range of relationships from minimal to strategic information alliances to entirely internal marketing arrangements. Alternative marketing arrangements are also increasing between packers and independent feedlots. The greatest increase has been in formula marketing type arrangements such as the Cactus-IBP arrangement. These captive supplies lead to thinner spot markets and fewer publically reported prices and thus impact the price discovery process.

In 1973, the twelve largest lamb slaughtering plants slaughtered 66 percent of the total lambs slaughtered, By 1988, the eight largest lamb slaughtering plants slaugtered

80 percent of the total lambs slaughtered. The most widely used forms of coordination for lamb slaughtering are packer owned feedlots, feedlots owned by both lamb feeders and packers, and custom feedlots. Lamb packers either fed or had fed 28 percent of the total number of lambs slaughtered in 1989. This raises concerns of the validity of publically available market information, since packer fed lamb data does not have to be made publically available.

In 1973, the nineteen largest pork slaughtering plants slaughtered 36 percent of the total hogs slaughtered. By 1988, the thirty-three largest hog slaughtering plants slaughtered 75 percent of the total hogs slaughtered. The most used form of coordination for pork slaughtering is the use of production contracting between packers and independent feeders (Ward 1992b).

With these structural changes in recent years, it is necessary to evaluate the behavior of the meat packing industry. To get a measure of the meat packing industry a measure of performance is needed. This research attempts to measure performance in the meat packing industry using publically reported data. Two public sources previously published annual performance in the meat packing industry. The American Meat Institute (AMI) previously published annual financial performance of their member firms, and Forbes magazine published an annual survey of the 500 largest corporations. But, as a result of structural changes, these sources no longer continue any publications on the meat packing firms. Now, meat packing firms are combined with other food manufacturing industries.

Moreover, these two sources only published annual performance figures, and the

data had several limitations (Ward 1988). By only providing an average annual measure of performance, these sources revealed nothing of the weekly variability or seasonality of performance within the year. When questions are raised about meat packing firm behavior, short-run behavior is often the subject. However, no short-run financial performance information is publically available. So, just having annual performance information was better than having nothing at all. Several private firms have developed gross margins series for the meat packing industry. These firms periodically, but not regularly, report gross margins in Cattle Buyers Weekly and other trade publications. No information is available to assess the reliability of the procedures and data from which reported gross margins are estimated.

1.2 Problem Statement

Can publically reported data be used to accurately estimate gross margins in the meat packing industry? Once these gross margins are estimated, the adequacy of the public data needs to be assessed to determine whether these gross margins are representative of actual meat packer gross margins in the industry.

1.3 Objectives

The general objective is to use public data to measure performance in the meat packing industry. If this data are adequate, anyone wishing to track meat packing performance can do so using publically available data. There are three specific objectives.

The first objective is to develop methodology to estimate gross margins in meat packing for beef, pork, and lamb based on available public market data and develop a

historical gross margin series.

The second objective is to explain the level and variability of gross margins over time, including between-year differences, within-year differences (including seasonality), and sex-grade-weight differences.

The third objective is to assess the adequacy of publically available market data for estimating, tracking, and monitoring meat packing industry margins.

1.4 Outline of Thesis

Chapter 2 reviews available literature on structural change in the meat packing industry, the costs associated with collecting public information, and ambiguity concerning meat packing market power issues. Chapter 3 presents the methodology used to estimate meat packer gross margins, and data being used to calculate these gross margins. Chapter 4 presents results of the study, including an explaination of the level and variability of gross margins across years, within years, and sex-grade-weight differences. Chapter 5 summarizes the findings and conclusions, including a discussion of the adequacy of using publically reported data.

Chapter 2

Literature Review

2.1 Introduction

The following review of previously published articles includes three sections. The first begins with the history of the meatpacking industry. The second includes public data issues and the value that should be given to public data. Finally, the third section discusses different opinions of the concerns dealing with increased concentration levels in the meat packing industry.

2.2 History of the Meat Packing Industry

The "Big Three" meatpacking firms were defined in the case of *Monfort of Colorado v. Cargill,* (Ward, 1992b). These "Big Three" firms include IBP, Excel, and Con Agra (Ward 1992a). These three firms account for between 75 - 80 percent of fed cattle slaughtered. Although they account for this much of the market, they are all competing for distribution markets. Four of the largest grocery chains, purchase different amounts of meat from each of these meat packing firms (Connor).

In 1980, four-firm concentration ratios for the slaughter of steers and heifers was 35.6%; by 1989 it rose to 70.4%. In 1972, large steer and heifer plants processed 7.5% of the total United States steer and heifer slaughter, and in 1988 large plants processed 65% of the total steer and heifer slaughter (Ward 1992b). A plant slaughtering 500,000 head or more annual volume is considered large. The industry structure has gone from

many, smaller meat packers to fewer, larger meat packers.

Economies of plant size is a major cause of the trend toward fewer, larger plants. Since there is an inverse relationship between costs and profits, as the size of a plant increases the average cost per unit of slaughter decreases. If the gross margin equation is the same for two different firms, the larger of the two will have the lowest cost and therefore realize the highest profit. This is an important relationship to consider when evaluating meatpacking concentration (Ward 1992b).

Growth in a single firm can occur in two ways. A firm may grow internally, by building new plants or purchasing unused ones. The second way is to merge with or acquire another firm, which is what happened in 1987. Two studies by Purcell (1990a, 1990b) show that consolidations between many of the firms came from consumer demand problems, issues such as fat content and cholesterol levels, in the red meat sector and the increased competition from the poultry industry. These demand problems put a ceiling on the price of red meat, so meat packers had to find alternative ways to remain profitable. One way was to gain from economies of size and therefore, we have fewer, but larger plants today.

IBP was the largest cattle slaughtering firm for many years prior to the 1980's. But IBP has grown significantly since then. IBP realized most of its growth internally, by expanding and improving their current plants and by building two of the largest slaughtering plants in the United States. It also diversified into hog slaughtering. It entered the hog market by purchasing several idle plants and expanding them to become the largest hog slaughtering company in the United States, along with being the largest

cattle slaughtering company in the United States.

ConAgra began in the meat packing industry by purchasing Armour Foods in the early 1980's. Unlike IBP, ConAgra gained most of its growth from merging and acquiring other firms. It purchased Monfort of Colorado and Swift Independent, two large meatpacking firms in 1987. ConAgra also slaughters hogs, lamb, and poultry. Currently, It is the second largest cattle and hog slaughtering company, the largest lamb slaughtering company, and including their poultry division, it is the largest overall meat company in the U.S.

Excel represents a combination of the two types of growth. It is a subsidiary of Cargill, which resulted from an acquistion of Excel by Cargill. Excel is currently the third largest cattle slaughtering company, and is the fourth largest hog slaughtering company in the U.S (Ward 1992b).

2.3 Information Issues

Preckel et al. suggest that public information is needed in public policy applications. Since there is a cost associated with obtaining this information, there needs to be a way to evaluate the benefits of public information in monetary terms. Preckel uses a cost-benefit analysis approach. If new information will lead to decisions which are preferred to old decisions then this information is valuable. Therefore, if the willingness to receive and the willingness to pay for the information is evaluated as two measures, then a monetary value can be calculated. But other benefits and costs also need to be included in the analysis. These benefits include: other users of the information, the expanded knowledge by the people who conducted the investigation, and

any other results that were obtained by the experiment. The costs include: the time implementing the experiment, making the information available to the users (producers), and making the information available to academia. Antonovitz and Roe show that when new information is used in the market, producers' utility will increase, but they also state that more research needs to be done to find out how much producers will pay for the information. The research presented in subsequent chapters assumes that if public information contributes to the market by making it more efficient, there will be a willingness to pay for the information. The first issue this thesis must evaluate is the accuracy of the public available information to measure meat packer performance.

2.4 Market Power Issues

Schroeter discusses the growing concern of concentration in the meat packing industry the past decade, where there could be a possibility of non-competitive pricing associated with the beef market. The author estimates a series of models to estimate monopoly and monopsony power. The results show that monopoly and monopsony price distortions are statistically significant, although they are extremely small in magnitude. Schroeter shows that while concentration levels have been increasing in recent periods, the magnitude of the monopoly and monopsony price distortions have not been increasing.

A study by Gisser shows an unambiguous relationship between changes in concentration and an increase in productivity in the food manufacturing industry. Another study by Mullen et al. shows that there is an unambiguous relationship between the changes in concentration and an increase in productivity in the meat packer industry.

Social gains and losses were the determining factors in the study. The results indicated that the increase in productivity which the study shows to be linked to concentration, is greater than the loss to consumers. Therefore, the authors conclude that any government policy that might cause restructuring in the industry would decrease social welfare (Mullen, Wohlgenant, and Farris). Ward's research conflicts with the previous studies. This article does not find a relationship between the amount of concentration and an increase in productivity in the meat packer industry. Therefore, no social welfare gains to society could be realized from increases in concentration in the meatpacking industry (Ward 1987). Ward (1988) also suggests that profit is considered to be higher in concentrated industries. The author gives three reasons: 1. Higher profits could be the result of higher output prices because of some type of oligopolistic or collusive coordination, 2. Higher profits could be the result of lower input prices because of some type of oligopsonistic or collusive coordination, 3. Profits could be the result of being more efficient and gaining from economies of scale, or a combination of all three. When market structure and profitability were analyzed, with limited information, results do not indicate a significant relationship between concentration and profitability. Also no significant relationship was found between firm size and profitability.

Geithman et al. studied the effect of regional packer concentration levels on the price of live cattle using the Herfindahl and the CR4 measures. These studies showed that in 1988, the last data available for the report, when concentration levels exceeded 60, significantly lower prices were paid for cattle in the given region. Therefore, with this type of evidence concerning concentration levels in the industry, competition may

decrease even further in the future (Geithman).

Menkhaus et al. discussed how industry structure affects prices from packer to feedlot. "When there is a high level of buyer concentration in a given local market for agricultural produce, price leadership, price discrimination, and other forms of collusive pricing are likely to occur" (p. 147). The authors show that buyer concentration is at a high level in the meatpacking industry. By using two different benchmarks for oligopoly power in the market-- 40% and 65%-- oligopoly power existed in 22 and 17 of the 23 largest cattle feeding states, respectively. After applying the Cochrane-Orcutt Iterative Technique, results indicated that as concentration increased, there was a negative effect on fed cattle prices. Their results suggest that further investigation needs to be done to see just how far this increase in concentration can go.

Cowling and Waterson use a theoretical model to determine if there is a relationship between structure and performance. The model compares price-cost margins to concentration. It begins by calculating the basic profit equation, then using it to calculate the mark-up price over marginal cost. Next, it uses the Herfindahl index with the theoretical model to find out how these price-cost margins compared to concentration. This study finds "the profit-revenue ratio is related directly to the Herfindahl index of concentration in the industry and inversely to the industry price elasticity of demand" (p. 269). As can be seen, there are many different conclusions resulting from increased concentration in the meatpacking industry.

2.5 Conclusion

Previously public data has not been used to calculate a gross margin series, and

compare this series to industry calculated gross margins. Therefore it is not known if publically available data accurately represents what is actually happening in the market, or whether additional data is needed. This is one of the objectives of this research. Further, can this data be used to determine if meat packers earn excessive profits, or does increased efficiency offset the potential abuse of market power.

CHAPTER 3

3.1 Theory

As shown in chapter two, meat packing industry structure has changed the past few years, and there is ambiguity concerning conduct in the industry. This raises the question of whether meat packing industry conduct is competitive or exhibits some type of oligopoly pricing. In the industrial organization paradigm, performance of the industry is the yardstick by which conduct is measured (Carlton). Profitability is the best way to measure performance in an industry, in this case the meat packing industry. The profit (Π) equation for a given firm, in its simplest form, is total revenue (TR) minus total costs (TC):

$$\Pi = TR - TC \tag{1}$$

In order to use this equation to compute profit, information must be available for the components of total revenue and total costs. Equation (2) shows the primary components of the profit equation for a meat packing firm.

$$\Pi = (R_M + R_{BY}) - (C_I + C_P) \tag{2}$$

In equation (2), profit (Π) is the difference in total revenue and total costs, where total revenue consists of revenue from meat sold (R_M) and revenue from by-products sold (R_{BY}), and total costs are cost of the live animal as an input (C_I), and the cost of processing the meat (C_P). Not all of the components of equation (2) are available to

calculate profit in meat packing. Available public data do not include any short run information on the cost of slaughtering and fabrication. The next possible criteria to get a measure of performance is to estimate gross margins:

$$GM = TR - C_I , \tag{3}$$

where gross margin (GM) for a given firm is total revenue (TR) minus cost of the input (C_I), in the case of the meat packing industry, the gross margin equation is

$$GM = (R_M + R_{BY}) - C_I , \tag{4}$$

where gross margin (GM) is revenue from selling meat (R_M) plus revenue from selling by-products (R_{BY}) minus the cost of the live animal input (C_I).

3.2 Data for Beef

With what seems to be a simple gross margin equation, there are many factors which contribute to each component of the gross margin equation. In the case of beef packing, revenue from the sales of meat contain variables for the price of boxed beef (PBB) and the quantity of boxed beef (QBB). Revenue from the sales of by-products contain variables for the price of by-products (PBY) and quantity of by-products (QBY). Costs of inputs are costs of purchasing live animals, which include the price of fed cattle (PFC) and quantity of fed cattle (QFC). Each of these variables include additional factors, such as different carcass weights, different qualities of meat, different sex of animals, price differences, and seasonality. The following chart shows, for each component of the gross margin equation, variables used to compute gross margins, and factors embodied within each variable, and even further variability within each factor.

Table 1. Variability affecting factors within variables of the Margin Components.

Margin Component	Variables	Factors	Variability within factors
R_M	PBB	weight quality grade	light (550-700) heavy (700 +) choice select
	QBB	weight of carcass -sex quality of carcass	differences in dressing % for steers and heifers choice select
R_{BY}	PBY	based on $/cwt.	
	QBY	live weight	more weight = more value
C_I	PFC	quality weight sex location	expected grade choice expected grade select light heavy price for steers price for heifers this study concentrates on one geographic region
	QFC	sex	weight of steers weight of heifers proportion of steers vs. heifers

This research concentrates on one geographic region, but location can also be a factor which affects the gross margin, since prices paid for cattle differ for a deficit region (low number of cattle available) versus a surplus region (high number of cattle available) (Tomek). Thus, there can be significant variability in the gross margin for a single week and from week to week. Given the variables involved in computing a weekly gross margin series, two procedures can be applied, using two different sets of data from the

Livestock, Meat, Wool Market News report.

3.2.1 Procedure 1

The first procedure involves using the gross margin equation (4), and applying the first set of data from the Livestock, Meat, Wool Market News report to it, which includes data from March 1990 to December 1994 on the variables to be used in the gross margin equation. From equation (4), the gross margin equation can be rewritten as

$$GM_{BEEF} = [(PBB * QBB) + (PBY * QBY)] - (PFC * QFC) \quad (5)$$

where

GM_{BEEF} = Weekly gross margin for beef

PBB = Boxed beef cutout value
Choice 550-700
Choice 700-850
Select 500-700
Select 700 and up

QBB = Dressed weight of animal
Federally Inspected (FI) dressed weight of steers and heifers

PBY = By-product value
Based on cwt. of live weight

QBY & QFC = Live weight of animal
Texas-Oklahoma live weight

PFC = Price of live weight (cwt.)
Western Kansas reported price

This data includes four weekly average boxed beef cutout values (FOB Central U.S., Omaha Basis), depending on the dressed weight of the carcass for the following groups:

1) Choice 550-700 lbs., 2) Choice 700-850 lbs., 3) Select 550-700 lbs. and, 4) Select 700 or more lb. carcasses. To calculate the meat portion of the revenue equation the dressed weight of the animal is needed along with the boxed beef cutout value. Data used includes weekly average federally inspected dressed weights for steers and heifers. The next part of the revenue portion of the equation includes revenue from by-products. The quantity of by-products is based on the live weight of the cattle for the Texas-Oklahoma region. The price per cwt. that hide and offals receive is current Central U.S. by-product prices. The final portion of the equation is the cost portion. This includes the price of fed cattle, which is the Western Kansas reported price, and the quantity of fed cattle, which is the Texas-Oklahoma live weight of cattle.

Several issues emerged using procedure 1 to calculate packer margins. The first is that there is only one live weight published, which includes both steers and heifers. Thus, only one live weight is available to calculate the by-product value, which averages less than $10 cwt. The same live weight is also used to calculate the cost portion of the equation. This leads to underestimation of the heifer margin and overestimation of the steer margin. The next problem is the same live weight is being used for dressed weights included in the 550-700 lb. group and 700-850 lb. group, of course, cattle from both groups would not have the same live weights, cattle in the 700-850 lb. group would have a larger live weight, which would increase the cost of the cattle more than it would increase the by-product part of the revenue portion of the equation. All of the steers are in the 700-850 lb. dressed weight group, and some of the heifers dressed in this group. Therefore the steer margins are being overestimated for the large boxed beef groups and

the heifers will be narrowly overestimated for this particular reason. Also, there was no breakdown of how many cattle would grade choice and how many cattle would grade select.

Using this set of public data, only an idea of margins for each category could be estimated. For example, a gross margin could be calculated by year for steers and heifers individually for each of the four boxed beef group. However, no information is available on the number of cattle grading choice or select, or how many light and heavy cattle are included in the slaughter mix.

3.2.2 Procedure 2

A more refined procedure was initiated using a different set of data, also available from the Livestock, Meat, Wool Market News report but the same gross margin equation from above is to be used with this data. Data are available beginning in March, 1990. This additional data include cattle sold on a live weight basis and cattle sold on a dressed weight basis, separately for steers and heifers from the Texas-Oklahoma, Kansas, Colorado, Nebraska, and Iowa-Southern Minnesota region. Both live and dressed weight sales include total number of head sold, number of cattle in lots which are expected to grade 80-100% choice, 65-80% choice, 35-65% choice, 20-35% choice, and 0-20% choice. Within each category a weighted average weight and weighted average price of cattle are reported. But every week doesn't have cattle in each category. The extreme categories, 80-100% choice and 20-35% choice or lower category are sporatically reported. When calculating the gross margins, the 0-20% group was left out due to the lack of observations for this category. The weighted average weights and prices are used

to calculate each of the gross margins. Equation (5) illustrates factors which affect the gross margin for beef packers.

$$GM_t = \sum_{j=1}^{J} \sum_{k=1}^{K} \sum_{l=1}^{L} \sum_{m=1}^{M} [(N_{jk}/N\ (PBB_{jk} * QBB_{jk}) + N_{lm}/N\ (PBY * QBY_{lm}) - N_{lm}\ (PFC_{lm} * QFC_{lm})] \quad (6)$$

In equation (5), the gross margin for a given week (GM_t) is the sum across some given portion of (J) carcasses grading either choice or select, (K) light or heavy carcass weights, (L) different buying groups of live animals, and (M) steers or heifers. This gross margin is dependent on the previous discussed variables, and the several factors within them. Factors within the revenue from the sales of meat is determined by (N_{jk}), the number of choice or select, light or heavy cattle, divided by (N), the total number of cattle being slaughtered for the week. These cattle are then used to determine the revenue by using the correct boxed beef cutout value (PBB) from the corresponding dressed weight. To determine the correct boxed beef cutout value, the factors which must be addressed include the breakdown between choice carcasses versus select carcasses and different values for light versus heavy carcasses. As shown in equation (6), the boxed beef cutout value (PBB), is chosen based on whether the dressed weight of the carcass (QBB) is either light or heavy (breaking point 700 lbs.)

$$PBB = [PBB_{light}\ if\ QBB_k \leq 700] \quad [PBB_{heavy}\ if\ QBB_k > 700] \quad (7)$$

To calculate whether the dressed weight of the carcass is either light or heavy, equation (7) multiplies the steer or heifer dressing percentage and the corresponding steer or heifer

live weight together, to get the dressed weight for both steers and heifers.

$$QBB_k = QFC_{lm} * DRPCT_{lm} \quad (8)$$

The revenue from sales of by-products is determined by (N_{lm}), the portion of cattle in the buying group for both steers and heifers, divided by (N), the total number of cattle being slaughtered. Factors affecting revenue collected from the sales of by-products includes which buying group the cattle are from and sex of the animal, due to greater live weight of steers compared to heifers and because the price of by-products depends on the live weight of each animal. Factors within the cost portion include grading discounts on live cattle, because lower quality animals from the lower quality buying groups will receive a lower live price than higher quality cattle. Live weights of cattle will have an effect on the price paid for live animals, as does sex of the animal, because steers and heifers have a different price series. The first advantage that procedure two has over procedure one, is that each category has the live weight published with it, so we are not overestimating the steer margins and underestimating the heifer margin due to a lack of detail on live weights. The next advantage is being able to come up with an estimate of how many cattle graded choice and how many cattle graded select. Finally we can calculate many different series of gross margins for each grading category, weighted overall grade categories, weighted steer, or heifer margins, and finally a weighted overall average which includes both steers and heifers in it.

Although we have this additional information, some assumptions have to be made. The first issue is the dressing percentage to be used for each buying group. After

conferring with animal scientists, a constant dressing percentage was assumed for each category of cattle, though some concern persisted for the categories including cattle grading 0-20% and 20-35% choice. The dressing percentage was calculated using the Federally Inspected (FI) dressed weight and dividing it by the weighted average live weight overall categories. Then the dressing percentage was applied to each individual live weight category to get the dressed weight for each buying group. The next assumption is how many of the cattle graded choice and how many of the cattle graded select. Assuming that the distribution of cattle in each category was normally distributed, the midpoint was used for each category. For example, the 35 to 65 percent buying group implies that 50 percent of cattle graded choice and 50 percent of cattle graded select. Although these assumptions have to be made with procedure two, a more realistic gross margin series can be calculated to get an estimate of the performance in the meat packing industry.

3.3 Data for Pork

It is not possible to calculate a pork margin series like procedure two for cattle, since no data are published on the number of hogs in each grading category, live prices paid for each individual grading category, and separate dressed weights or separate live weights for each grading category. The only gross margin series which can be calculated for pork will be comparable to procedure 1 for cattle, where all that can be calculated is an estimate for each quality grade, #1, #2, #3, and #4.

For pork, equation (4) is rewritten as:

$$GM_{PORK} = [(P_{PC} * Q_{PC}) + VAL_{BY})] - (P_{SH} * Q_{SH}) \quad (9)$$

where

GM_{PORK} = Weekly gross margin series for pork

P_{PC} = Pork carcass cutout values
#1, #2, #3, and #4

P_{PC} = Dressed weight of hogs
Federally Inspected (FI) dressed weight of barrows and gilts

VAL_{BY} = By-product value
Based on per head basis

P_{SH} = Live price of slaughter hogs

Q_{SH} = Live weight of slaugter hogs

Public data needed to calculate the gross margin series for pork comes from the Livestock, Meat, Wool Market News report. The revenue portion of the equation has two contributions; meat value and by-product value. Data needed for the first portion of the revenue equation is pork carcass cutout values (P_{PC}) (based on a 175 lb. carcass) in one of the four grading categories, and FI dressed weights (Q_{PC}) of barrows and gilts. Data needed for the next portion of the revenue equation is the value of by-products (VAL_{BY}). Since there are no published figures on by-products value for hogs, the total revenue from by-products is calculated from reported Agricultural Marketing Service prices for by-products, using a LMIC formula which is similar to that used by AMS for beef by-products.

The final part of the gross margin equation is the cost portion. Two types of data are needed, live animal prices (P_{SH}) and live animal weights (Q_{SH}). Two different live

animal price series are compared. First is a six market average[1], and the Iowa-Southern Minnesota direct market. The same two markets are used for live weight data, six market average and Iowa-Southern Minnesota direct markets. Applying this data to equation (9), a gross margin series can be calculated for pork. This series is only an idea of what the gross margin is for each category due to the fact that no data are available on the proportion of hogs within each quality category. This is the best estimate which can be made for pork with data currently available.

3.4 Data for Lamb

Lamb, like pork, does not have a breakdown between slaughter lamb categories, similar to that used in procedure two for cattle. So again, only an estimated gross margin series can be calculated for lamb for each category. Given the gross margin equation for lamb from equation (4):

$$GM_{LAMB} = [(P_{BL} * Q_{BL}) + PELT] - (P_{SL} * Q_{SL}) \quad (10)$$

where

GM_{LAMB} = Weekly gross margin series for lamb

P_{BL} = Lamb cutout and boxed values

Q_{BL} = Dressed weight of lamb

PELT = Price of pelts

P_{SL} = Live price of slaughter lambs

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[1]October 1991, Kansas City market dropped to make a 6 market average, and April 1994 National Stockyards dropped to make a 5 market average.

Q_{SL} = Live weight of slaughter lambs

Public data used to calculate gross margins for lamb were obtained from the Lamb and Wool Market News report published by the American Sheep Industry Association. Gross margins for lamb require revenue and cost information. Data needed to calculate the revenue portion of the equation includes boxed lamb cutout values, lamb carcass values, dressed weight of lambs, and pelt values. Gross margins for lamb were calculated from 1990 to 1994 using carcass prices, but data were only available from May 1992 to 1994 to calculate gross margins using cutout values. East Coast wholesale cutout prices (P_{BL}) are reported for dressed weights of the following categories: 55 lbs. or less, 55-65 lbs., 65-75 lbs., 75-85 lbs., and an average of 40-75 lbs. Since the average dressed weights did not fall below 55 lbs. or above 75 lbs. during the period being evaluated, only the 55-65 lb. and 65-75 lb. carcass prices are valid for this data series. In May 1992, lamb cutout values began being reported. These values are reported for carcasses of 65 lbs. and down, or greater than 65 lbs. The quantity of boxed lamb (Q_{BL}) is the average dressed weight of lambs. Pelt prices (Pelt) used are #1 grade pelts.

Data needed to calculate the cost portion of the gross revenue equation includes the live price of slaughter lambs and live weight of slaughter lambs. The live price of slaughter lambs (P_{SL}) is a national average price for slaughter lambs. The quantity of slaughter lambs (Q_{SL}) is the average live weight of lambs slaughtered. As with pork, no data are available on the distribution of live lamb weights. Applying this data to equation (10), an estimated gross margin series can be calculated using boxed lamb cutout values

for 1992 through 1994, and a series can be calculated using carcass prices for 1990 through 1994. Again, these are only an estimate of what gross margins would be for each category, and no overall lamb packing margin can be calculated given the data available at this time.

Chapter 4

Results

4.1 Introduction

This chapter explains the level of gross margins over the five year period (March 1990-1994) for beef, 1988-1994 for pork, and 1990-1994 for lamb. This chapter also evaluates factors which affect the variability of gross margins during this period, the level and variabiltiy of gross margins within years, how seasonality affects gross margins within the year, and a simple way to calculate weekly gross margins for beef.

4.2 Beef Packer Margins

In chapter three, it was shown that many different weekly gross margin series for beef could be calculated. A gross margin series can be calculated for each buying group; 80-100%, 65-80%, 35-65%, and 20-35% choice. Within each buying group, by assuming that the distribution of cattle is normally distributed, a weighted gross margin series for cattle grading choice and cattle grading select can be calculated. Since the data include separate numbers for steers and heifers being slaughtered, an overall steer and heifer margin series can be calculated, an overall weighted choice and an overall weighted select margin series, and finally an overall weighted average with both steers and heifers combined for the final beef packer's gross margin series (Tables 2 to 4). Appendix A contains calculated weekly gross margins for beef using procedure two's data.

The beef packer's overall average gross margin for 1990 to 1994 was $72.99 per head (Table 2 and figure 1). 1990 and 1991 gross margins were $87.94 and $85.00, which are $14.95 (20.48) percent and $12.01 (16.45) percent respectively, above the five year average. However, 1990 margins are overstated since the data do not begin until March. In 1992, there was a dramatic decrease in the level of gross margins. Gross margins fell by 23.56 percent from the previous year, and were 10.99 percent below the five year average. Factors which contributed to the decrease in gross margins from 1991 to 1992 include: (1) boxed beef cutout value decreased by $1.44 or 1.23 percent from 1991 to 1992; (2) live steer price increased by $0.99 or 1.32 percent from 1991 to 1992; (3) live weight increased by 4.22 lbs or 0.36 percent, which combined with the increase in live price, increased the cost of the live animal $14.82 or 1.69 percent; (4) dressed weight increased by 2.83 lbs. or 0.37 percent, but with a 1.23 percent decrease in the boxed beef cutout value, revenue from sales of meat decreased by $7.62 or .86 percent per head; (5) revenue from sales of by-products had the only positive impact on gross margins as by-product values increased by $0.13 or 1.75 percent per hundred weight (cwt.) of the live animal. Combined with live weight increase of 0.36 percent, the effect of by-products on gross margins was an increase in revenue of $1.84 or 2.11 percent from 1991 to 1992.

The change in gross margins from 1991 to 1992 was the result of a decrease in revenue from sales of meat of $7.62, increase in revenue from sales of by-products of $1.84, and an increase in cost from purchasing live animal inputs of $14.81, which gave a net change in gross margins of -$20.59 or -24.22 percent from 1991. Using the

individual components to compute changes in gross margins results in a decrease of 24.22 percent which nearly equals the actual change in gross margins of 23.56 percent, so these factors explained the change in gross margins from 1991 to 1992.

Gross margins decrease again from 1992 to 1993. Gross margins fell 11.96 percent below the previous year, and were 21.63 percent below the five year average. Factors which contributed to the decrease in gross margins from 1992 to 1993 include: (1) boxed beef cutout value increased by $1.96 or 1.69 percent; (2) steer live price increased by $1.41/cwt. or 1.87 percent from; (3) live weight decreased by 6.85 lbs or 0.58 percent, which combined with the increase in live price to increase the cost of the live animal $11.36 or 1.28 percent; (4) dressed weight decreased by 12.73 lbs. or 1.68 percent, although boxed beef cutout value increased by 1.87 percent, revenue from meat sales decreased by $0.10 per head; and (5) revenue from sales of by-products, which had the only positive impact on gross margins as by-product values increased by $0.21 or 2.78 percent cwt. of the live animal. Combined with a decrease in live weight of 0.58 percent, the effect of by-products on gross margins was an increase in revenue of $1.95 or 2.19 percent from 1992 to 1993.

The change in gross margins from 1992 to 1993 from a decrease in revenue from sales of meat of $0.10, increase in revenue from sales of by-products $1.95, and an increase in cost from purchasing live animal inputs of $11.36, which gave a net change in gross margins of -$9.51 or -14.64 percent from 1992. The net change in gross margins of 14.64 percent from the components used to compute gross margins, nearly equals the total change in gross margins of 11.04 percent, so these factors nearly explain

all of the change in gross margins from 1992 to 1993.

Gross margins reversed the trend and increased dramatically in 1994 and increased by 27.15 percent above the previous year. The 1994 average margin level of 72.73 was slightly below the five year average by 0.36 percent. Factors which contributed to the increase in gross margins from 1993 to 1994 include: (1) boxed beef cutout value decreased by $11.07 or 9.39 percent; (2) steer live price decreased by $7.39/cwt. or 9.61 percent; (3) live weight increased by 36.16 lbs. or 3.08 percent, which combined with the decrease in live price to decrease the cost of the live animal $61.49 or 6.82 percent; (4) dressed weight increased by 28.72 lbs. or 3.84 percent, but with a 9.39 percent decrease in boxed beef cutout value, revenue from sales of meat decreased by $52.05 or 5.91 percent per head; (5) revenue from sales of by-products had a positive impact on gross margins as by-product value increased by $0.59 or 7.60 percent cwt. of the live animal. Combined with live weight increase of 3.08 percent, the effect of by-products on gross margins was an increase in revenue of $9.93 or 10.92 percent from 1993 to 1994.

The change in gross margins from 1993 to 1994 from a decrease in revenue from sales of meat of $52.05, increase in revenue from sales of by-products $9.93, and an decrease in cost from purchasing live animal inputs of $61.49, which gave a net change in gross margins of $19.37 or 33.86 percent from 1993. Changes in gross margins from the components used to compute gross margins of 33.86 is close to total change in gross margins of 27.15 percent, but has overestimated the percentage change in gross margins somewhat.

4.3 Steer versus Heifer Impacts

Some interesting comparisons between steer and heifer average gross margins can be made over the 1990 to 1994 period (Table 2). In 1990, steer average gross margins were $2.63/head more than for heifers, but may be due to the short year. But in 1991, heifer average gross margins were higher than steers by $1.32/head. This spread between heifers and steers gross margin became larger in 1992 and 1993, $2.87 and $7.81/head respectively, and in 1994 the spread declined to $2.04/head. There appears to be a correlation between the dressing percentage of steers versus heifers, percentage of steers versus heifers being slaughtered, and the difference between the average gross margins of steers versus heifers between years. First, comparing the percentage of steers versus heifers and the gross margin relationship. The percentage of steers slaughtered in 1990 was the smallest for the time period of this research, 60.03 percent. Thus 39.97 percent of the cattle slaughtered were heifers, and this is the only year that steer average gross margins were higher than heifer margins. In 1991, slightly more steers were slaughtered than in the previous year, 60.56 percent of the total cattle slaughtered, and heifer margins were more than steer margins by $0.14/head. In 1992, more steers were slaughtered than in 1991 totaling 62.32 percent of the total cattle slaughtered, and the spread between heifer gross margins and steer gross margins became larger by $2.87/head. In 1993 the largest percentage of steers being slaughtered was recorded at 63.09 percent, and the largest spread between the heifer gross margin and steer gross margin was realized at $7.81/head. Finally in 1994, the percentage of steers slaughtered fell back to the 1992 range of 62.06 percent, and the spread between heifers gross

margins and steer gross margins decreased to $2.04/head, which is near the 1992 spread.

The five year average for steer dressing percentage is 64.205, 0.575 percent less than the heifer five year average dressing percentage of 64.775. In 1990, heifer dressing percentage exceeded steers dressing percentage by 0.46, when steers gross margins were higher than heifers gross margins. In 1991, the spread in dressing percentages increased to 0.54 and heifers gross margins became higher than the steers gross margins. In 1993, the spread between dressing percentages was at its highest level at .86, when the spread between steers and heifers gross margins were at its highest level at $7.81/head.

4.4 Within-Year Variation for Beef

Beef packer average gross margins are at the highest levels during the months of June through September (Figure 2). June had the highest monthly gross margin level, at $85.19/head, which is $12.20/head or 16.71 percent above the five year annual average of $72.99/head. The next highest month is August, which averaged $84.66/head, and is $11.67 or 15.99 percent above the five year average. May, July, and September are the other months which are above the five year annual average at $73.80, $78.78 and $78.22/head, or 1.11 percent, 7.93 percent, and 7.17 percent above the five year average respectively. The remaining months (January, February, March, April, October, November, and December) average between $62.54 and $72.57/head, and range from -$10.45/head or -14.32 percent to -$0.42/head or -0.58 percent less than the five year average.

From January to April, five year average monthly gross margins decreased by $6.55/head or 9.41 percent from the January level. The three primary components of

gross meat packing margins include revenue from sales of meat, revenue from sales of by-products, and costs of purchasing live cattle as the input. During these months revenue from the sales of meat increased by $6.18/head or 0.71 percent. Within this component, there are five variables which influence revenue from sales of meat; choice and select boxed beef cutout values (Figures 3,4), dressed weight (Figure 5), the proportion of steers versus heifers in the mix (Figure 6), the proportion of choice and select cattle slaughtered (Figure 7), the boxed beef cutout value spread between light and heavy carcasses (figure 8,9). In all cases during this data period, steer average dressed weights were greater than 700 lbs., so heavy boxed beef cutout values were used for steers, and the heifer average dressed weight were less than 700 lbs., so light boxed beef cutout values were used for heifers.

The five year average monthly choice boxed beef cutout value increased by $4.17/cwt. or 3.56 percent, while the select boxed beef cutout value increased by $4.69/cwt. or 4.14 percent. The proportion of choice cattle slaughtered increased by 0.0014, which offset the dressed weight decrease of 20.25 lbs. or 2.68 percent. The light-heavy price spread decreased by $1.00/cwt., along with the proportion of heifers decreasing by 0.0338 for a decrease in revenue of $2.71 from the light-heavy spread. All of these factors combined for a net positive increase in revenue from sales of meat of $6.18/head.

The next component is the revenue received from the sales of by-products. The two variables used to calculate this component are by-product value (Figure 10) and live weight (Figure 11) of the live animal input. The average by-product value decrease was

$0.22/cwt. or 2.75 percent, combined with the live weight decrease of 32.77 lbs. or 2.77 percent. As a result, the revenue received from the sales of by-products decreased by $5.15/head or 5.46 percent.

The final component is the cost of purchasing the live animal input. The two variables used to calculated this cost include the live price and live weight (Figure 11). The live price increased by $3.16/cwt. or 4.16 percent, and the live weight, the same as used to calculated the by-product value decreased by 32.77 lbs. or 2.77 percent. Although the live weight decreased, the increase in live price increased the total cost of purchasing the live animal input by $11.40/head or 1.27 percent. The combined effect of the three revenue and cost components produces a net change of -$10.37/head. Comparing this to the change in the five year average of -$6.55, indicates that gross margins are not as variable on a weekly basis (five year averages) as when computed from monthly average changes of individual components.

From April to August, gross margins increased by $21.63/head or 34.32 percent. Within the revenue from sales of meat, choice boxed beef cutout value decreased by $7.98/cwt. or 6.58 percent, select boxed beef cutout values decreased by $9.58/cwt. or 8.12 percent, but proportion of choice cattle increased by 0.0091, and dressed weight increased by 35.98 lbs. or 4.90 percent. The light-heavy price spread increased by $1.08/cwt., and proportion of heifers slaughtered increased by 0.0246 resulting in an increase in revenue from sales of light carcasses. Although dressed weight increased, boxed beef cutout value decreased more in value to result in a net decrease in revenue of $20.64/head or 2.34 percent.

By-product value decreased by $0.13/cwt. or 1.67 percent, but live weight increased by 43.97 lbs. or 3.83 percent. This increase in live weight outweighs the decrease in by-product value to produce a gain in by-product revenue of $1.87/head or 2.10 percent.

With respect to live animal input, live price decreased by $6.78/cwt. or 8.57 percent, while live weight increased by 43.97 lbs. or 3.83 percent, resulting in a decrease in the cost of live cattle of $46.07/head or 5.07 percent. The net change in revenue from April to August from using monthly averages is an increase in gross margins of $27.30/head. Comparing this to the changes in the five-year weekly average of $21.63/head, indicates that gross margins during the months from April to August are more variable on a weekly basis (five year averages) than using the monthly average changes of individual components.

From August to December, gross margins decreased by $15.44/head or 18.24 percent. Choice boxed beef cutout value increased by $1.28/cwt or 1.13 percent, and select boxed beef cutout value increased by $0.04/cwt. or 0.04 percent, while dressed weights decreased by 6.48 lbs. or 0.84 percent. The light-heavy price spread increased by $0.086/cwt., and the proportion of heifers increased by 0.0156, causing an increase in revenue from light carcasses of $0.37/head. The effect that revenue from meat sales had on gross margins was a decrease of $1.39/head or 0.16 percent, because the proportion of choice carcasses sold decreased by 0.0088. Increases in boxed beef cutout values did not offset the decrease in dressed weights, light-heavy price spread increase, and proportion of light carcasses slaughtered. Revenue from by-product sales increased

by \$9.26/head or 10.16 percent, due to increased by-product value of \$0.75/cwt. or 9.82 percent, combined with the increase in live weights of 3.81 lbs or 0.32 percent. From the cost of purchasing the live animal input, live price increased by \$1.90/cwt. or 2.63 percent, in addition to the increase in live weights of 3.81 lbs. or 0.32 percent, the cost of purchasing the live animal increased by \$25.49/head or 2.95 percent. Combining the three components, the net effect was a decrease of \$14.84/head on the monthly averages, compared to the change in the weekly averages over the five year period of a decrease of \$15.44/head, which indicates that during the months of August to December, gross margins are more variable on a weekly basis (five year averages) than using monthly average changes of individual components.

4.5 Estimating Weekly Beef Packer Margins

This section shows a simple way of calculating beef packer gross margin for a given week. The beef packer's gross margin is comprised of a mix of steers and heifer which will grade either choice or select. Given the public data used in this research, cattle are purchased based on expectations of how they will grade. After gross margins have been calculated over the five year period, The following model was estimated by ordinary least squares (OLS) regression and first order autocorrelation was corrected by the Cochrane-Orcutt procedure. The estimated model is as follows

$$GM_t = \alpha + \delta_1 PBB + \delta_2 SPRD_{LG} + \delta_3 SPRD_{CH} + \delta_4 PBY + \delta_5 PFC + \delta_6 DRPCT + \delta_7 PER_{ST} + \delta_8 QFC + \lambda_1 T + \lambda_2 T2 + \phi D1 \quad (11)$$

where

GM_t - Gross margin for week t
PBB - Boxed beef cutout value for choice 700-850
$SPRD_{LG}$ - Choice 700-850 - Select 700 & up
$SPRD_{CH}$ - Choice 550-700 - Choice 700-850
PBY - By-product value (cwt.)
PFC - Price of live animal input
DRPCT - Dressing percentage for steers
PER_{ST} - Percentage of steers slaughtered
QFC - Live weight of steers
T - Weekly time trend variable
T2 - Time trend variable squared
D1 - Dummy variable for June 12, 1993

Estimated regression results are presented in table 5. It is already known how the gross margin is calculated for a given week, but a linear regression can be used to simplify the calculations for any given week. Since more steers are slaughtered than heifers, and knowing that the average weight of steers doesn't fall below 700 lbs., the choice 700-850 boxed beef price is used as the base boxed beef price. The spread between choice 700-850 and select 700 & up will be used to take into account the select cattle in the mix, and to avoid multicollinearity if both boxed beef cutout values were used in the model. The spread between choice 550-700 and choice 700-850 is used to account for heifers, since heifers usually fall in the choice 550-700 group, and again to avoid multicollinearity in the model. The by-product value is the price per hundred weight paid for by-products based on the live weight of the animal. The live price is the price paid for steers, which is usually very close to the price paid for live heifers. To avoid multicollinearity again, steer dressing percentage was used rather than both the dressed weight of steers and heifers. The percentage of steers in the mix was used to account for changes in the number of steers versus heifers from week to week. The live weight of steers was used

to account for the seasonality of live weights during the year. A dummy variable for June 12, 1993 was included, because the observation was causing nonnormal distribution of the error terms. Quadratic time trend variables were included to explain exogenous factors affecting gross margins over time. The model was corrected for autocorrelation. By using these coefficients it is much quicker and easier to calculate beef packer's gross margin for a week, rather than computing the all of the weighted averages needed to calculate the gross margin.

Estimating a gross margin for November 5, 1994 using the regression, results in an estimate of $43.47/head. From equation (5), an example of a calculated gross margin is as follows:

(12)

$$
\begin{aligned}
41.82 = {} & [47349 * [((368/47349*.9) * (101.83 * 771.98)) + ((368/47349*.1) \\
& * (95.67 * 771.98)) + ((10155/47349*.725) * (101.83 * 803.88)) \\
& + ((10155/47349*.275) * (95.67 * 803.88)) + ((35111/47349 * .50) \\
& * (101.83 * 782.83)) + ((35111/47349 * .50) * (95.67 * 782.83)) \\
& + ((1715/47349 * .275) * (101.83 * 780.91)) + (1715/47349 * .725) \\
& * (95.67 * 780.91))] + [(368/47349) * (1210 * 9.18) + (10155/47349) \\
& * (1260 * 9.18) + (35111/47349) * (1227 * 9.18) + (1715/47349) \\
& * (1224 *9.18)] - [(368/47349 * 1210 * 68.50) \\
& + (10155/47349 * 1260 * 68.32) + (35111/47349 * 1227 * 69.46) \\
& + (1715/47349 * 1224 * 68.59] / 100] \\
& + [39886 * [((225/39886*.9) * (101.83 * 783.67)) + ((225/39886*.1) \\
& * (95.67 * 783.67)) + ((8355/39886*.725) * (101.83 * 742.19)) \\
& + (8355/39886*.275) * (95.67 * 742.19)) + ((30479/39886*.5) \\
& * (101.83 * 717.56)) + ((30479/39886*.5) * (95.67 * 717.56)) \\
& + ((827/39886*.275) * (101.83 * 715.61)) + ((827/39886*.725) \\
& * (95.67 * 715.61))] + [(225/39886) * (1209 * 9.18) + (8355/39886) \\
& * (1145 * 9.18) * (30479/39886) * (1107 * 9.18) + (827/39886) \\
& * (1104 * 9.18)] - [(225/39886 * 1209 * 68.73) \\
& + (8355/39886 * 1145 * 68.45) + (30479/39886 * 1107 * 69.58) \\
& + (827/39886 * 1104 * 68.70)] / 100] / 47349 + 39886
\end{aligned}
$$

It is apparent that many calculations are required to estimate a gross margin, but using

the regression equation (11), these calculations can be simplified.

Finally, procedure one, procedure two, and the regression can be compared to each other. The easiest way to calculate gross margins is to use either procedure one or the regression. If procedure one is utilized, then an overall beef packer gross margin can not be calculated. Procedure two produces a better estimate of gross margins. However, as shown in equation (12), it takes many calculations to estimate gross margins using procedure two. Therefore, a regression was estimated, to get an estimate of gross margins using procedure two. Figure 12 calculated as procedure one's gross margin minus procedure two, and the regression estimates minus procedure two. Evaluating this figure shows that using procedure one is much more variable from week to week than the regression estimate.

4.6 Pork Packer Margins

As noted in chapter three, data for pork is not as detailed as that for beef. With the pork data available, it is not possible to get overall pork packer margins weighted by the number of hogs which grade #1, #2, #3, and #4, but with the data that are available, it is possible to compare gross margins across geographical regions using different prices paid for live animals and different live weights of animals. Since the same federally inspected (FI) dressed weight, by-product value, and live price paid are used for each grading group, and the only difference in gross margins between #1, #2, #3, and #4's are due to pork carcass cutout value, the gross margins between the groups only differ by the spread between the carcass prices. Appendix B contains calculated weekly gross margins for pork.

4.7 Six Market Average Versus Iowa-Southern Minnesota

The seven year average gross margin, using six market data and #1 carcasses, is $11.33/head (Table 6). From 1988 to 1991, gross margins steadily increased from $9.47 to $10.93/head, a 15.42 percent increase from the 1988 level, but was still below the seven year average by $0.40/head or 3.53 percent (Figure 13). During this time, pork carcass cutout value increased by $8.05/cwt. or 13.11 percent from 1988, dressed weights increased by 3.44 lbs. or 1.99 percent, and by-product value decreased by $0.46/head or 4.04 percent. Live price increased by $5.59/cwt. or 12.86 percent, and live weight increased by 1.1 lbs. or 0.44 percent. From 1992 to 1993, gross margins ranged from $12.11 to $15.82/head, an increase of 30.64 percent above the 1992 level, and also above the seven year average by 39.63 percent. During this period, average monthly pork carcass cutout value decreased by $1.32/cwt. or 2.19 percent, dressed weights increased by 3.9 lbs. or 2.21 percent, and by-product value decreased by $1.41/head or 13.1 percent. The cost portion of gross margins changed by a live price decrease by $2.66/cwt. or 6.29 percent, and live weight increase by 3.95 lbs. or 1.59 percent.

Gross margins for the Iowa-Southern Minnesota region exhibited a different pattern than for the six market average across years. The seven year average gross margin, using Iowa-Southern Minnesota data and #1 carcass values, is $11.39/head. The Iowa-Southern Minnesota gross margins increased from 1988 to 1989, decreased from 1989 to 1991, increased from 1991 to 1992, decreased from 1992 to 1993, and finally a large increase from 1993 to 1994 (Table 6, Figure 13). Since Iowa-Southern

Minnesota uses the same pork carcass cutout value, FI dressed weight, and by-product value as the six market average gross margin series, differences between the two gross margin series lies within the live price and live weight. From 1988 to 1989, the six market average live price increased by $0.57/cwt. or 1.31 percent, and Iowa-Southern Minnesota live price increased by $0.51/cwt. or 1.15 percent, while the six market average live weight increased by .62 lbs. or .25 percent, where Iowa-Southern Minnesota live weights decreased by 1.28 lbs. or .53 percent. With these changes in live prices and weights, gross margins for both regions were increasing. From 1989 to 1990, the six market average live price increased by $10.55/cwt. or 23.96 percent, and Iowa-Southern Minnesota live price increased by $10.69/cwt. or 23.77 percent, while the six market average live weight increased by .16 lbs or .0006 percent, and Iowa-Southern Minnesota live weights increased by 2.21 lbs. or .92 percent. Gross margins for six market average increased from 1989 to 1990, but gross margins for Iowa-Southern Minnesota decreased. From 1990 to 1991, the six market average live price decreased by $5.57/cwt. or 10.2 percent, and Iowa-Southern Minnesota decreased by $5.57/cwt. or 10 percent, while six market average live weights increased by 0.32 lbs. or 0.13 percent, where Iowa-Southern Minnesota live weights increased by 2.19 lbs. or 0.9 percent. Again gross margins for six market average increased, while Iowa-Southern Minnesota gross margins decreased. From 1991 to 1992, six market average live price decreased by $6.75/cwt. or 13.77 percent, Iowa-Southern Minnesota live price decreased by $6.84/cwt. or 13.65 percent, six market average live weight decreased by .65 lbs. or .26 percent, and Iowa-Southern Minnesota live weight decreased by .65 lbs. also or .27 percent. With these decreases

in live prices and weights, gross margins for both regions increased. From 1992 to 1993, six market average live price increased by $3.21/cwt. or 7.59 percent, Iowa-Southern Minnesota live price increased by $3.11/cwt. or 7.19 percent, six market average live weight increased by 2.13 lbs. or .86 percent, and Iowa-Southern Minnesota live weight increased by 2.55 lbs. or 1.04 percent. With these increases in live prices and live weights, both six market average and Iowa-Southern Minnesota gross margins decreased from 1992 to 1993. From 1993 to 1994, six market average live price decreased by $5.87/cwt. or 12.91 percent, Iowa-Southern Minnesota live price decreased by $6.12/cwt. or 13.2 percent, six market average live weight increased by 1.82 lbs. or .73 percent, and Iowa-Southern Minnesota live weight increased by 1.32 lbs. or .53 percent. With these decreases in live prices and increases in live weights, gross margins increased to their highest levels for both regions at $15.82/head for six market average, and $15.89/head for the Iowa-Southern Minnesota region.

4.8 Within-Year Variation for Pork

Gross margins for six market average and Iowa-Southern Minnesota region follow the same seasonal pattern throughout the year. Both regions are above the seven year average during the months of September through December, and peak in the month of November. From January to August, gross margins are below the seven year average, and are at the lowest during May (Figure 14). When gross margins are increasing during the year, the live price for the animal is decreasing. When gross margins are at their peak in November, live price is at its lowest level within the year (Figure 15). Pork carcass cutout values follow the same seasonal pattern as live prices, and are at their

lowest level during November (Figure 16). Since gross margins are at their highest level, live price is decreasing more than the pork carcass cutout value is. Since only one dressed weight is used, live and dressed weights follow the same seasonal pattern for both regions (17,18). By-product values are below the seven year average January through May, December, and are at a minimum in April. From June to November, by-product values are above the seven year average, and are at a maximum in October (Figure 19).

4.9 Lamb Packer Margins

As it was for pork, overall lamb packer margins cannot be calculated, due to data restrictions on numbers of lambs in each category. Only an indication of what lamb margins would be in each category can be calculated. Lamb packer gross margins averaged $17.69 and $10.47 for the 55-65 lb. and 65-75 lb. categories respectively in 1990 (Table 6). In 1991, gross margins declined for the 55-65 lb. category to $12.82 and increased for the 65-75 lb. category to $12.34. This was a decrease of $4.87 or 27.53 percent from 1990 for the 55-65 lb. category, and an increase of $1.87 or 17.86 percent from 1990 for the 65-75 lb. category. In 1992, gross margins were $12.47 for the 55-65 lb. category, and $12.35 for the 65-75 lb. category. This was a decrease of $0.35 or 2.73 percent for the 55-65 lb category, and an increase of $0.01 for the 65-75 lb. category. This was also the first year data were available to calculate gross margins using boxed lamb cutout values. The gross margin using these cutout values averaged $18.49 in 1992 (Figure 20). In 1993, gross margins were $14.75 for the 55-65 lb. category, and 13.35 for the 65-75 lb. category. This was an increase of $2.28 or 18.28

percent for the 55-65 lb. category, and an increase of $1.00 or 8.10 percent for the 65-75 lb. category. Cutout gross margins increased by $5.63 or 30.45 percent above the 1992 level. In 1994, gross margins were $16.66 for the 55-65 lb. category, and $15.09 for the 65-75 lb. category. This was an increase of $1.91 or 12.95 percent above the 1993 level for lambs in the 55-65 lb. category, and an increase of $1.74 or 13.03 percent above the 1993 level for the 65-75 lb. category. Cutout gross margins increased by $4.34 or 17.99 percent above the 1993 level. Overall average carcass prices gross margins from 1990 to 1994 for the 55 to 65 lb. category were $13.88 and $12.72 for the 65-75 lb. category. Overall average cutout gross margins from 1992 to 1994 were $24.33. Appendix C contains calculated weekly gross margins for lamb.

4.10 Within-Year Variability for Lamb

Gross margins using carcass prices for the 55-65 lb. category and 65-75 lb. category (Figure 21) do not follow the same seasonal pattern during the year. With lambs, the same dressed weight, by-product value, live price and live weight are used to calculate gross margins, so variability in gross margins come from prices used to calculate revenue from meat sales. First, evaluating 55-65 lb. gross margins show a highly volitale gross margin from month to month. Gross margins begin at their lowest point during the year in January of $12.12, while carcass value for 55-65 lb. category (Figure 22) is also at its lowest point during the year. Both, gross margins and carcass values increased through March. Gross margins increased by $2.19 or 18.07 percent, and carcass value increased by $14.52 or 11.8 percent. From March to April gross margins decreased by $0.51 or 3.56 percent, while carcass value decreased by $1.52 or

1.10 percent. From April through December, gross margins and carcass values remain volatile in the sense that, they will increase one month and decrease the next month.

Gross margins using carcass values for lambs in the 65-75 lb. category have a different seasonal pattern after April, than do 55-65 lb. lamb carcasses. Similar to lighter category, 65-75 lb. gross margins are at their lowest level in the month of January at $9.41, along with seasonally low carcass values (Figure 22). Gross margins increase through March to a level of $11.72 or 24.55 percent above the January level, while carcass value increased to $133.68 or 12.83 percent above the January level. From March to April, both gross margins and carcass values decrease by $2.10 or 17.92 percent and $4.02 or 3.01 percent respectively. From April to September, gross margin increased by $6.34 or 65.9 percent above the April level, while carcass value increased by $8.85 or 6.83 percent above the April level. In the remaining months from September to December, gross margins decreased by $3.56 or 22.31 percent, while carcass value decreased by $6.55 or 4.73 percent.

The final margin series to evaluate is gross margins using cutout values (Figure 23). Again, gross margins using cutout values use the same dressed weight, by-product value, live weight, and live price. The only difference is the price used to calculate the revenue from sales of meat. Gross margins using boxed lamb cutout values have a different seasonal pattern than do either of the gross margins using carcass values. Gross margins using cutout values are at their lowest level in June. From January to April, gross margins increased by $6.39 or 21.1 percent above January's level, while cutout values increased through March by $11.97 or 7.65 percent, but declined from March to

April by $7.84 or 4.65 percent (Figure 24). From April to June, gross margins decreased by $9.09 or 30.02 percent, and cutout value decreased by $10.70 or 6.66 percent. From June to August gross margins increased by $4.66 or 21.99 percent, while cutout value increased by $15.55 or 10.37 percent. Gross margins decreased from August to October by $4.41 or 17.06 percent, and cutout value decreased by $11.47 or 6.93 percent. Finally, from October to December, gross margins increased by $5.74 or 26.77 percent, while cutout value increased by $14.82 or 9.62 percent.

Table 2. Average, Maximum, Minimum, Gross Packing Margins for Beef, March 1990 to December 1994.

	Beef Weighted Avg.	Choice	Select	Steers	Heifers
			$/Head		
1990					
Avg	87.94	105.65	58.83	88.99	86.36
Max	107.92	132.53	80.08	111.29	102.36
Min	65.07	71.73	36.45	65.30	64.47
1991					
Avg	85.00	99.33	65.10	84.46	85.78
Max	133.27	144.83	117.57	133.94	132.10
Min	58.12	72.68	36.39	51.88	63.81
1992					
Avg	64.97	79.49	47.52	63.91	66.78
Max	90.22	114.78	76.42	90.62	89.49
Min	44.02	49.17	21.11	40.76	43.45
1993					
Avg	57.20	71.51	41.46	54.27	62.08
Max	80.10	99.98	70.04	78.50	91.32
Min	31.65	43.50	11.29	25.99	36.69
1994					
Avg	72.73	89.23	53.90	71.91	73.95
Max	111.57	132.68	94.57	115.84	108.89
Min	41.82	56.39	16.46	38.93	45.24
1990-94					
Avg	72.99	88.38	52.39	72.06	74.53
Max	133.27	144.83	117.57	133.91	132.10
Min	31.65	43.50	11.29	25.99	36.69

Table 3. Average, Maximum, Minimum Gross Packing Margins for Steers, March 1990 to December 1994.

		Choice Steers				Select Steers			
		80-100%	65-80%	35-65%	20-35%	80-100%	65-80%	35-65%	20-35%
1990	Avg	110.18	106.72	108.98	123.57	53.43	52.69	55.80	71.52
	Max	145.95	135.76	138.09	174.31	75.50	76.64	79.17	99.67
	Min	71.92	70.59	75.34	74.22	19.44	24.25	27.35	30.56
1991	Avg	106.24	103.36	96.77	105.79	69.55	67.85	62.47	71.66
	Max	162.00	144.10	145.96	153.83	116.27	116.09	119.00	127.23
	Min	63.67	65.94	66.92	78.32	23.21	28.17	30.67	41.32
1992	Avg	83.13	83.95	77.04	82.57	48.61	50.37	44.63	50.83
	Max	118.52	126.05	124.30	127.14	83.26	79.54	75.18	81.28
	Min	44.69	48.96	43.28	50.21	8.21	21.00	22.71	31.55
1993	Avg	73.85	76.26	67.44	71.99	42.24	44.31	36.80	41.98
	Max	114.55	101.49	98.20	103.18	87.32	75.98	66.00	71.75
	Min	38.41	42.89	37.41	41.59	-4.32	6.08	2.62	11.60
1994	Avg	100.60	98.70	86.92	87.66	63.85	61.06	50.85	59.27
	Max	174.62	150.26	134.62	132.87	139.52	100.82	94.94	97.50
	Min	46.87	53.70	48.00	49.72	20.61	23.72	9.12	19.74
1990-94	Avg	94.23	93.30	86.57	92.46	55.51	55.38	49.89	58.30
	Max	174.62	150.26	145.96	174.31	139.52	116.09	119.00	127.23
	Min	38.41	42.89	37.41	41.59	-4.32	6.08	2.62	11.60

Table 5. Regression Equation Estimates for Overall Beef Packing Margins.

Variable	Coefficient	Standard Error	t-ratio	Probability
constant	-783.06	43.25	-18.11	0
PBB	7.3047	0.1564	46.7	0
$SPRD_{LG}$	-3.4474	0.148	-23.29	0
$SPRD_{CH}$	0.93334	0.352	2.652	0.009
PBY	9.9882	0.7159	13.95	0.018
PFC	-11.064	0.1844	-59.99	0
DRPCT	1026.1	39.56	25.94	0
PER_{ST}	0.30845	1.252	0.2464	0.806
QFC	0.10443	0.01849	5.649	0
T	-0.11699	0.02173	-5.384	0
T2	0.00034	0.00009	3.801	0
D1	-13.675	2.395	-5.71	0
Full Model				
F-value	1055.72			
R-Square	0.9798			

Table 6. Average, Maximum, Minimum Gross Packing Margins for Pork, 1988 to 1994.

	6-Mkt. Average				Iowa-Southern Minnesota			
	#1	#2	#3	#4	#1	#2	#3	#4
1988								
Avg	9.47	6.18	2.90	-0.39	9.70	6.41	3.12	-0.16
Max	16.58	13.28	9.97	6.65	17.10	13.93	10.76	7.60
Min	-1.92	-5.25	-8.59	-11.93	2.54	-0.94	-4.43	-7.91
1989								
Avg	9.57	5.96	2.34	-1.27	10.87	7.27	3.65	0.03
Max	18.84	14.57	10.29	6.03	16.59	12.97	9.32	5.70
Min	4.53	0.45	-3.61	-7.69	6.21	2.91	-0.98	-5.06
1990								
Avg	10.00	5.69	1.38	-2.93	10.66	6.35	2.03	-2.27
Max	23.72	19.51	15.30	11.10	22.41	1.21	14.00	9.79
Min	1.42	-3.29	-8.03	-12.75	3.41	-1.14	-5.72	-10.36
1991								
Avg	10.93	7.00	3.12	-0.85	10.32	6.30	2.50	-1.46
Max	23.63	19.98	16.33	12.69	22.75	19.05	15.33	11.63
Min	4.23	0.04	-4.16	-8.35	3.68	-0.51	-4.72	-8.91
1992								
Avg	12.11	8.47	4.85	1.19	11.45	7.81	4.19	0.54
Max	16.27	12.55	8.83	5.11	15.55	11.88	8.32	4.74
Min	6.84	2.88	-1.07	-5.02	7.24	3.14	-0.96	-5.06
1993								
Avg	11.33	7.64	3.94	0.25	10.81	7.13	3.43	-0.26
Max	17.39	13.90	10.40	6.91	16.76	13.27	9.77	6.28
Min	6.40	2.67	-1.05	-4.77	6.45	2.74	-0.95	-4.64
1994								
Avg	15.82	12.57	9.29	6.05	15.89	12.64	9.36	6.11
Max	39.43	36.25	33.06	29.90	39.49	36.30	33.12	29.95
Min	5.84	2.58	-0.68	-3.94	6.13	2.87	-0.39	-3.64
1988-94								
Avg	11.33	7.66	3.98	0.31	11.39	7.72	4.05	0.37
Max	39.43	36.25	33.06	29.90	39.49	36.30	33.12	29.95
Min	-1.92	-5.25	-8.59	-12.75	2.54	-1.14	-5.72	-10.36

Table 7. Average, Maximum, Minimum Gross Packing Margins for Lamb, 1990 to 1994.

	Carcass 55-65#	Carcass 65-75#	Cutout Value
1990			
Avg	17.69	10.47	
Max	12.69	17.12	
Min	-3.94	-10.14	
1991			
Avg	12.82	12.34	
Max	18.16	17.71	
Min	7.98	4.68	
1992			
Avg	12.47	12.35	18.49
Max	24.83	24.83	31.85
Min	6.24	5.04	12.14
1993			
Avg	14.75	13.35	24.12
Max	24.73	21.33	33.27
Min	8.73	8.73	17.05
1994			
Avg	16.66	15.09	28.46
Max	23.22	19.66	40.61
Min	12.60	8.66	20.26
1990-94			
Avg	13.88	12.72	24.33
Max	24.83	24.84	40.61
Min	-3.94	-10.14	12.14

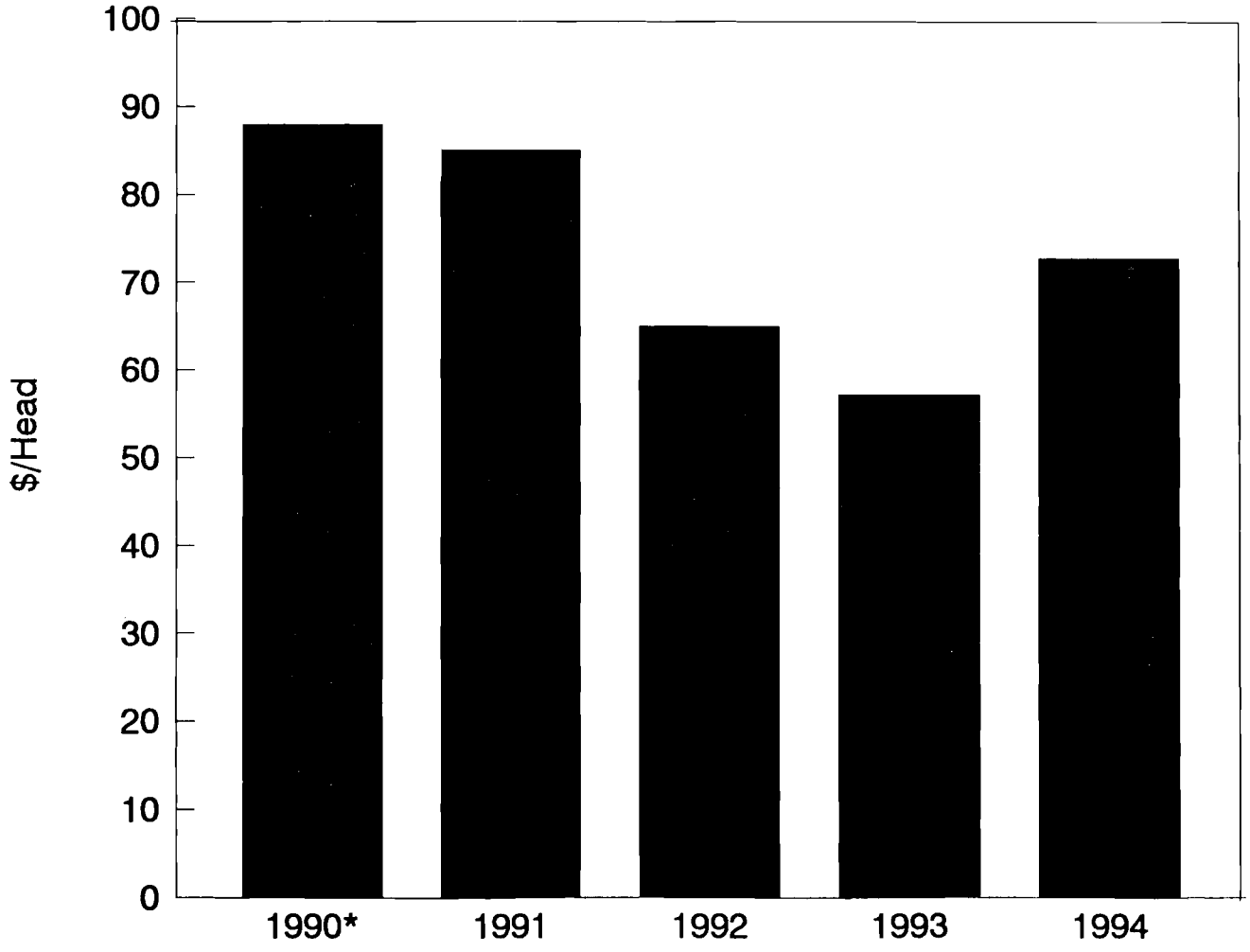
Table 8. Seasonal Variation of Gross Beef Packing Margins and Components.					
Month	Gross Margin	Boxed Beef Value ch. 700-850	Boxed Beef Value se. 700 & up	Live Price	Live Weight
January	69.58 (-3.41)	117.07 (+1.11)	113.34 (+2.28)	75.97 (+1.12)	1181.44 (+2.74)
February	64.71 (-8.28)	118.26 (+2.30)	115.35 (+4.29)	77.23 (+2.38)	1172.35 (-6.35)
March	62.54 (-10.45)	120.88 (+4.92)	118.15 (+7.09)	79.29 (+4.44)	1154.35 (-24.35)
April	63.03 (-9.96)	121.24 (+5.28)	118.03 (+6.97)	79.13 (+4.28)	1148.67 (-30.03)
May	73.80 (+0.81)	121.49 (+5.53)	114.01 (+2.95)	76.81 (+1.96)	1149.23 (-29.47)
June	85.19 (+12.20)	117.68 (+1.72)	110.61 (-0.45)	73.68 (-1.17)	1159.18 (-19.52)
July	78.78 (+5.79)	112.41 (-3.55)	107.57 (-3.49)	71.86 (-2.99)	1180.36 (+1.66)
August	84.66 (+11.67)	113.26 (-2.70)	108.45 (-2.61)	72.35 (-2.50)	1192.64 (+13.94)
September	78.22 (+5.23)	111.77 (-4.19)	107.51 (-3.55)	72.53 (-2.32)	1202.57 (+23.87)
October	72.57 (-0.42)	111.10 (-4.86)	105.74 (-5.32)	72.52 (-2.33)	1206.52 (+27.82)
November	69.84 (-3.15)	113.13 (-2.83)	107.74 (-3.32)	73.82 (-1.03)	1196.52 (+17.82)
December	69.22 (-3.77)	114.54 (-1.42)	108.49 (-2.57)	54.25 (-0.60)	1196.45 (+17.75)

Difference between five year monthly average and annual average are in parentheses.

Table 8 cont'd. Seasonal Variation of Gross Beef Packing Margins and Components.				
Month	Dressed Weight	By-product Value	Choice-Select Spread	Light-Heavy Spread
January	754.71 (-2.13)	7.99 (+.13)	3.73 (-1.17)	0.94 (+0.23)
February	750.70 (-6.14)	7.68 (-.18)	2.91 (-1.99)	0.83 (-0.11)
March	740.03 (-16.81)	7.70 (-.16)	2.73 (-2.17)	0.51 (-0.43)
April	734.46 (-22.38)	7.77 (-.09)	3.21 (-1.69)	0.17 (-0.77)
May	734.59 (-22.25)	7.76 (-.10)	7.47 (+2.57)	-0.48 (-1.42)
June	742.35 (-14.50)	7.77 (-.09)	7.07 (+2.17)	-0.09 (-1.03)
July	758.91 (+2.07)	7.67 (-.19)	4.84 (-0.06)	0.36 (-0.58)
August	770.44 (+13.60)	7.64 (-.22)	4.81 (-0.09)	1.25 (+0.31)
September	776.14 (+19.30)	7.86 (0.00)	4.26 (-0.64)	1.97 (+1.03)
October	780.62 (+23.78)	8.00 (+.14)	5.36 (+0.46)	2.16 (+1.22)
November	771.04 (+14.20)	8.12 (+.26)	5.39 (+0.49)	2.04 (+1.10)
December	763.93 (-7.09)	8.39 (+.53)	6.05 (+1.15)	1.34 (+0.40)

Difference between five year monthly average and annual average are in parentheses.

Figure 1. Annual Average Gross Margins for Beef



*1990 - March-December

Figure 2. Average Gross Beef Packing Margins

March 1990 - December 1994

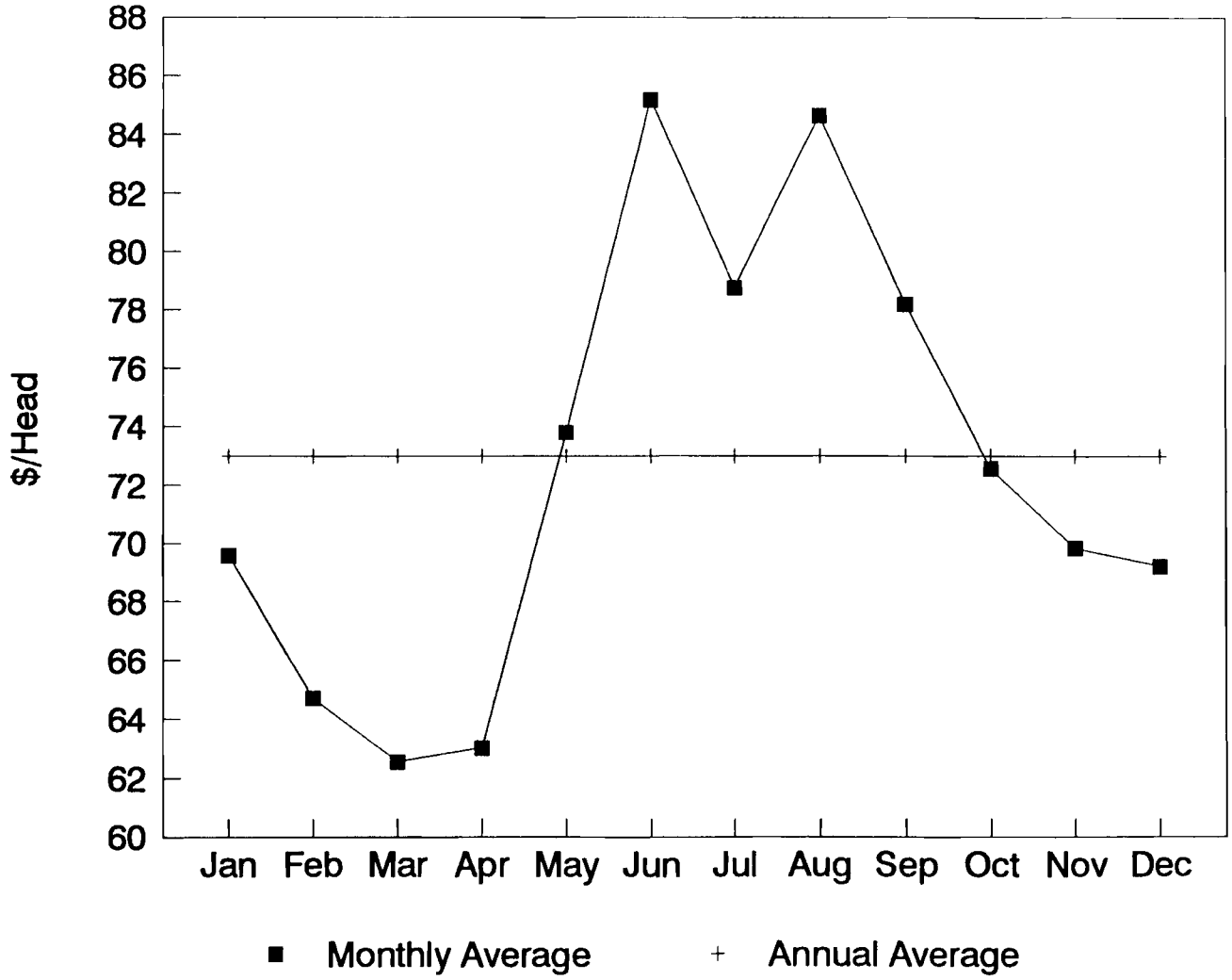


Figure 3. Average Choice and Select Boxed Beef Cutout Values

March 1990 - December 1994

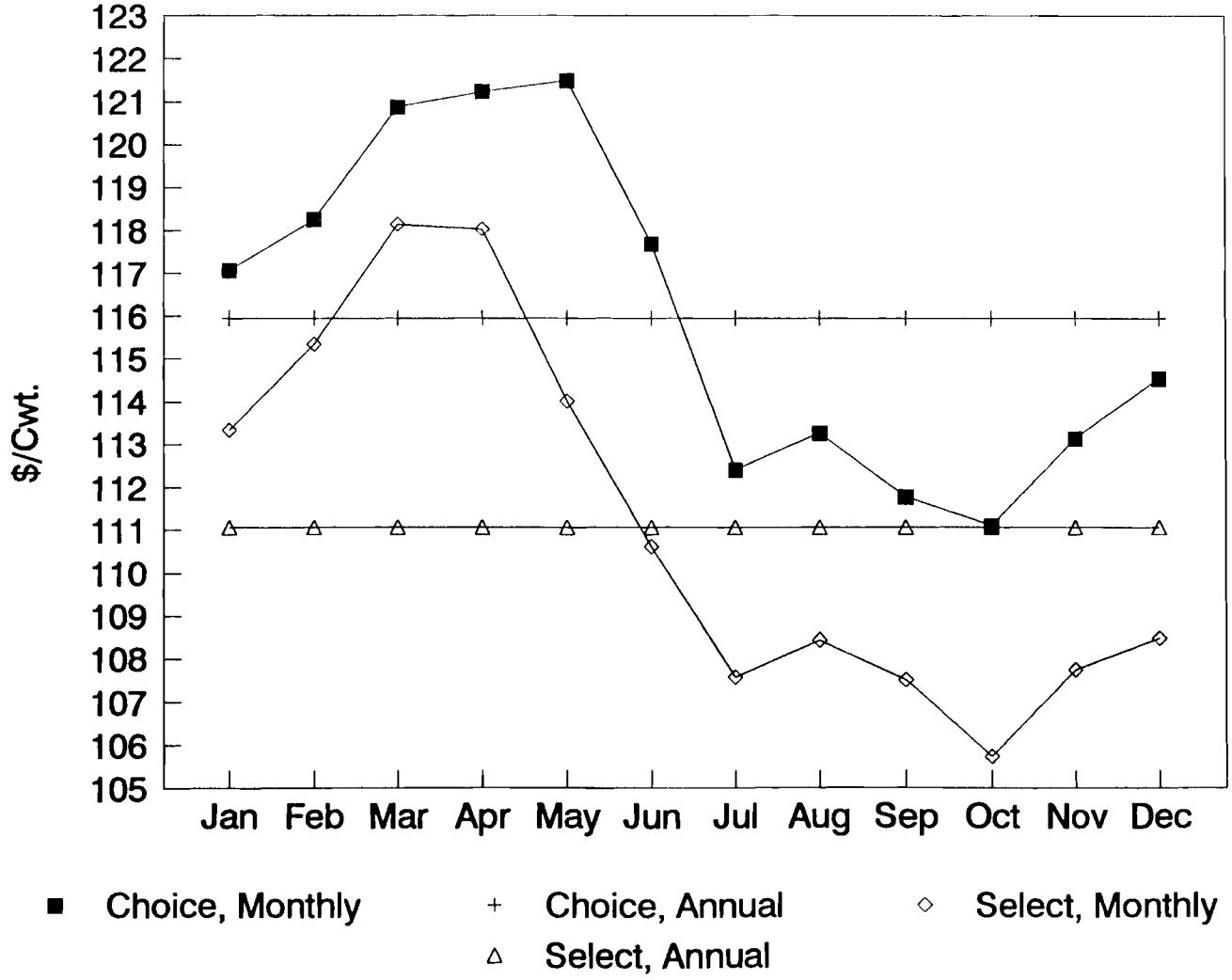


Figure 4. Average Choice-Select Spread

March 1990 - December 1994

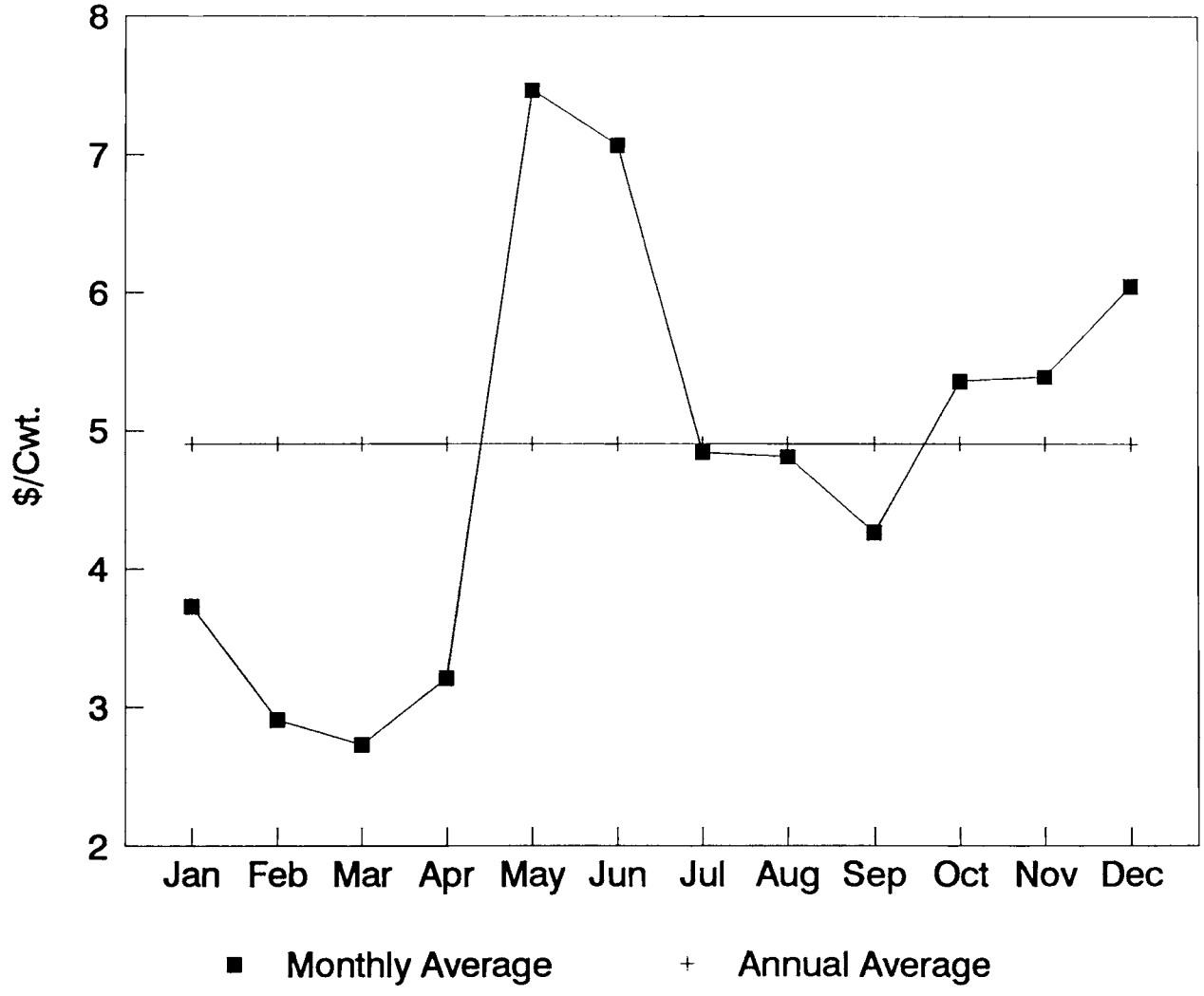


Figure 5. Average Dressed Weight for Steers

March 1990 - December 1994

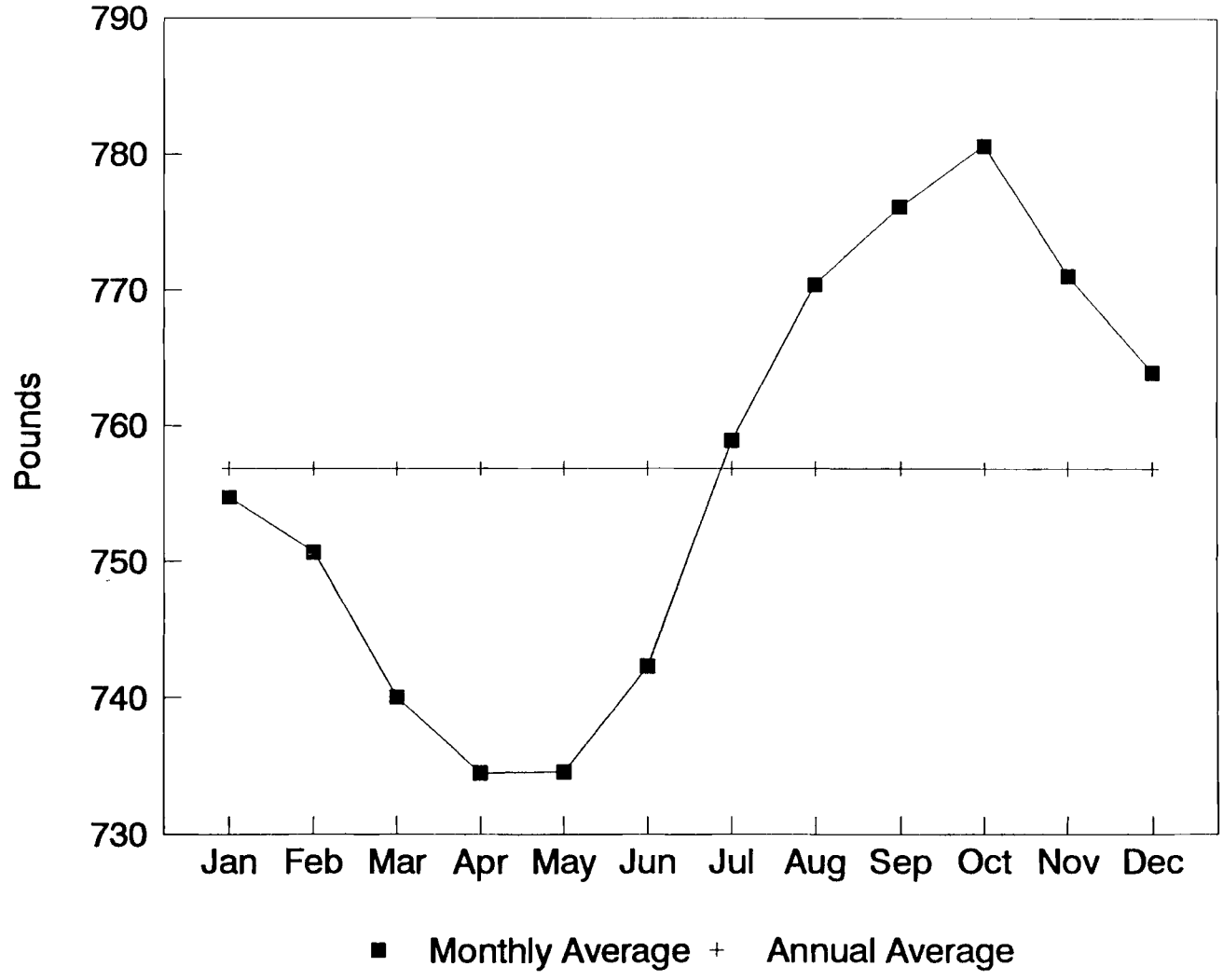


Figure 6. Average Proportion of Steers & Heifers Slaughtered

March 1990 - December 1994

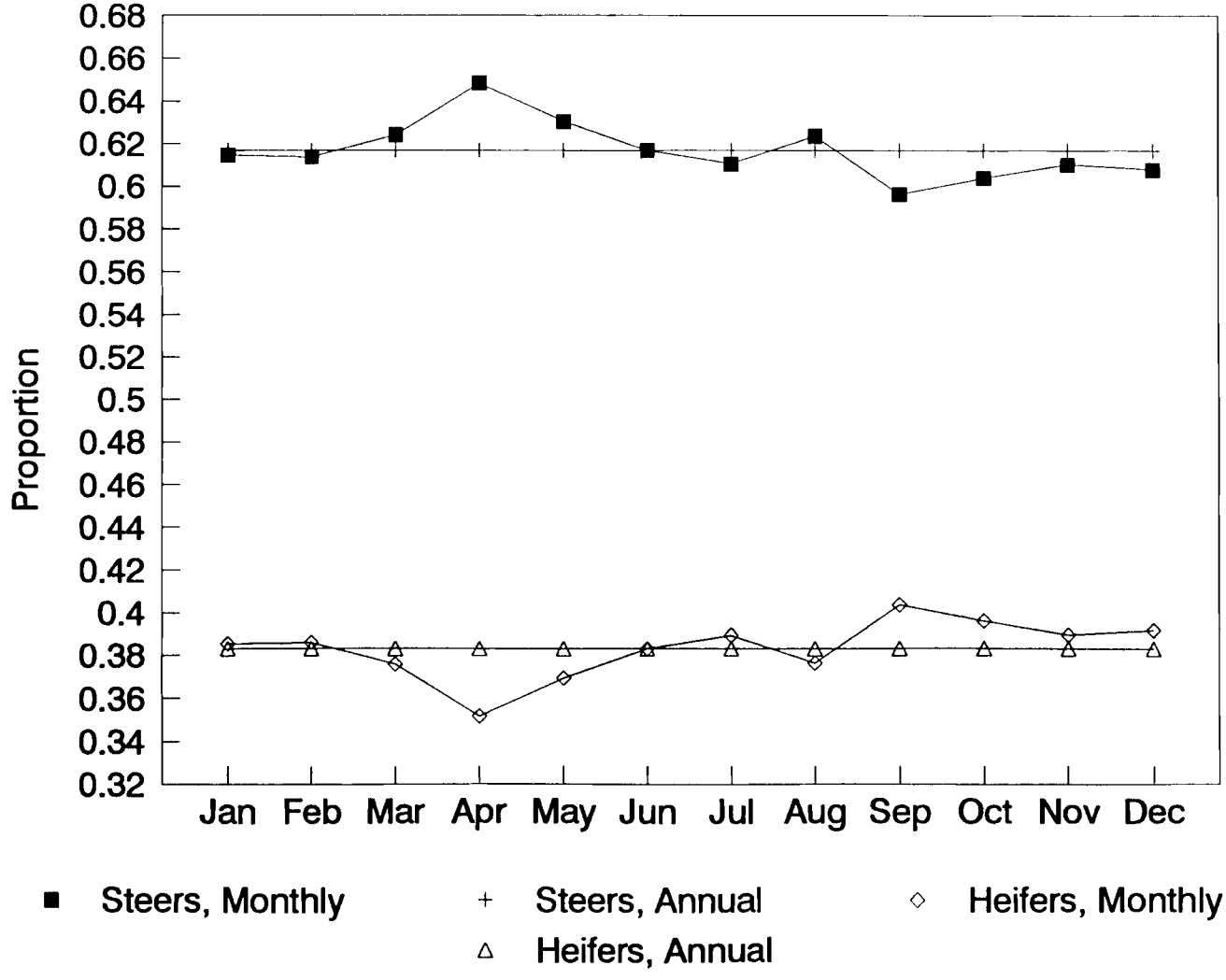


Figure 7. Average Proportion of Choice & Select Slaughtered

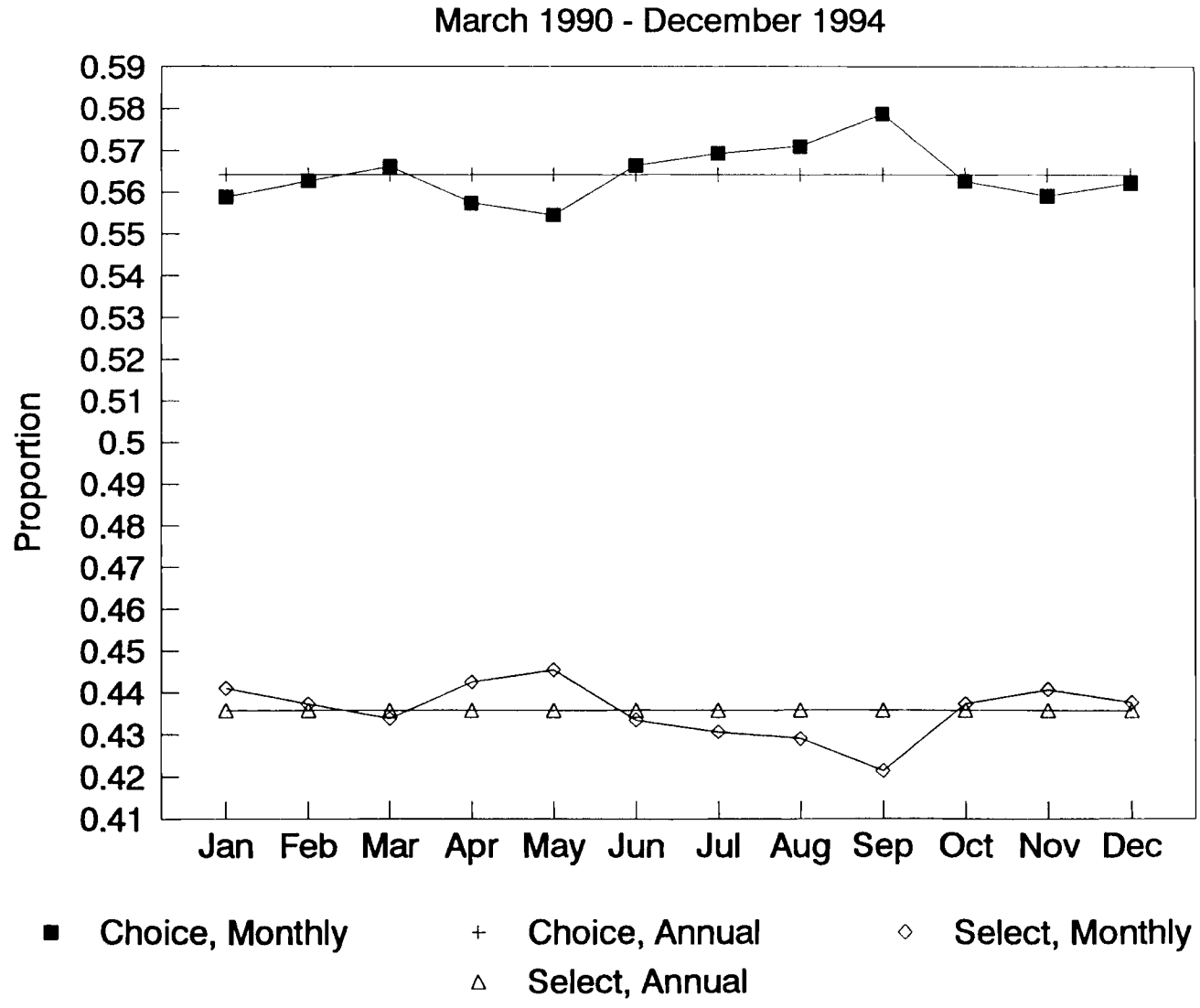
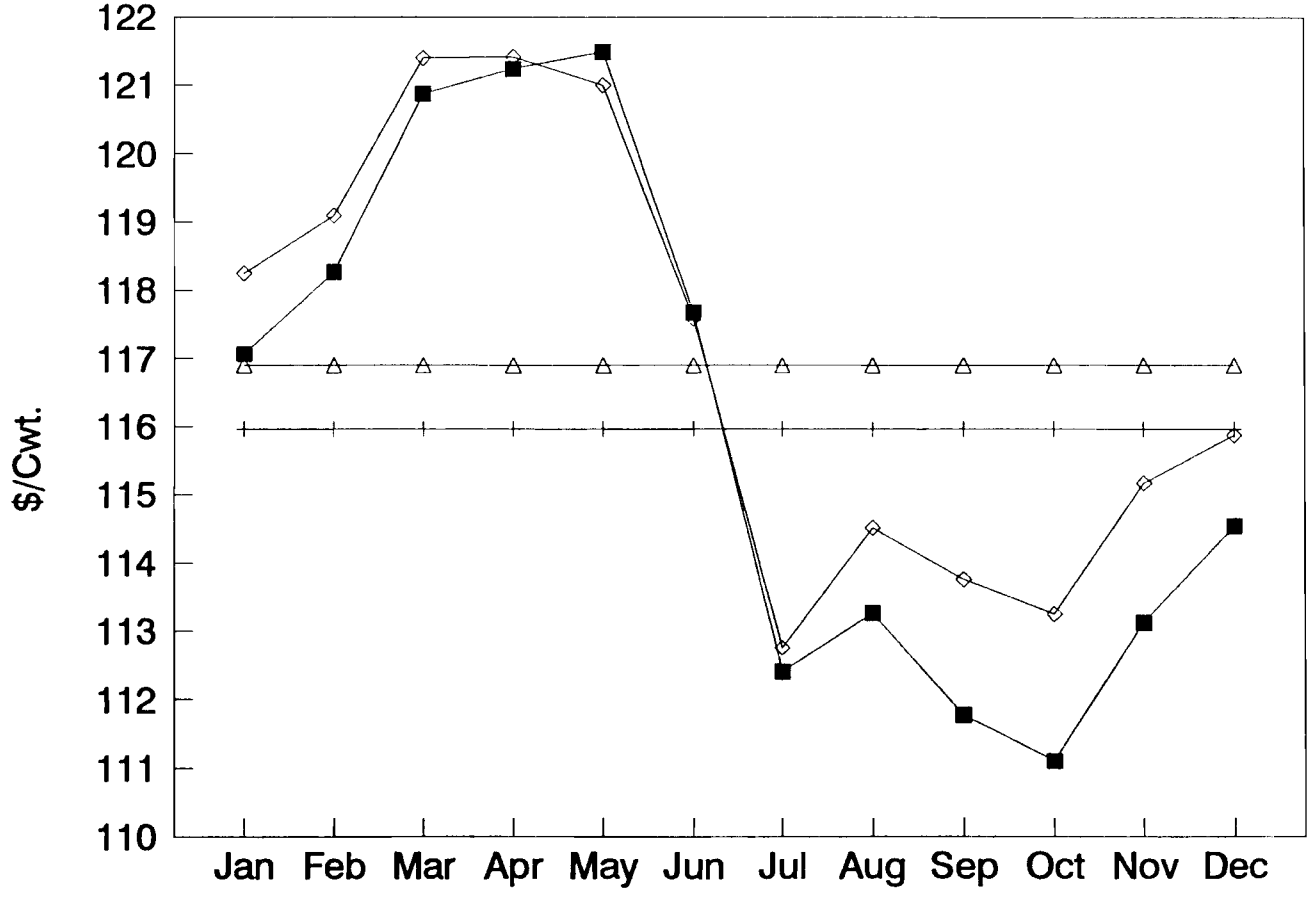


Figure 8. Average Light and Heavy Boxed Beef Cutout Values

March 1990 - December 1994



■ Monthly Avg. Heavy + Annual Avg. Heavy ◇ Monthly Avg. Light

△ Annual Avg. Light

Figure 9. Average Light-Heavy Boxed Beef Cutout Value Spread

March 1990 - December 1994

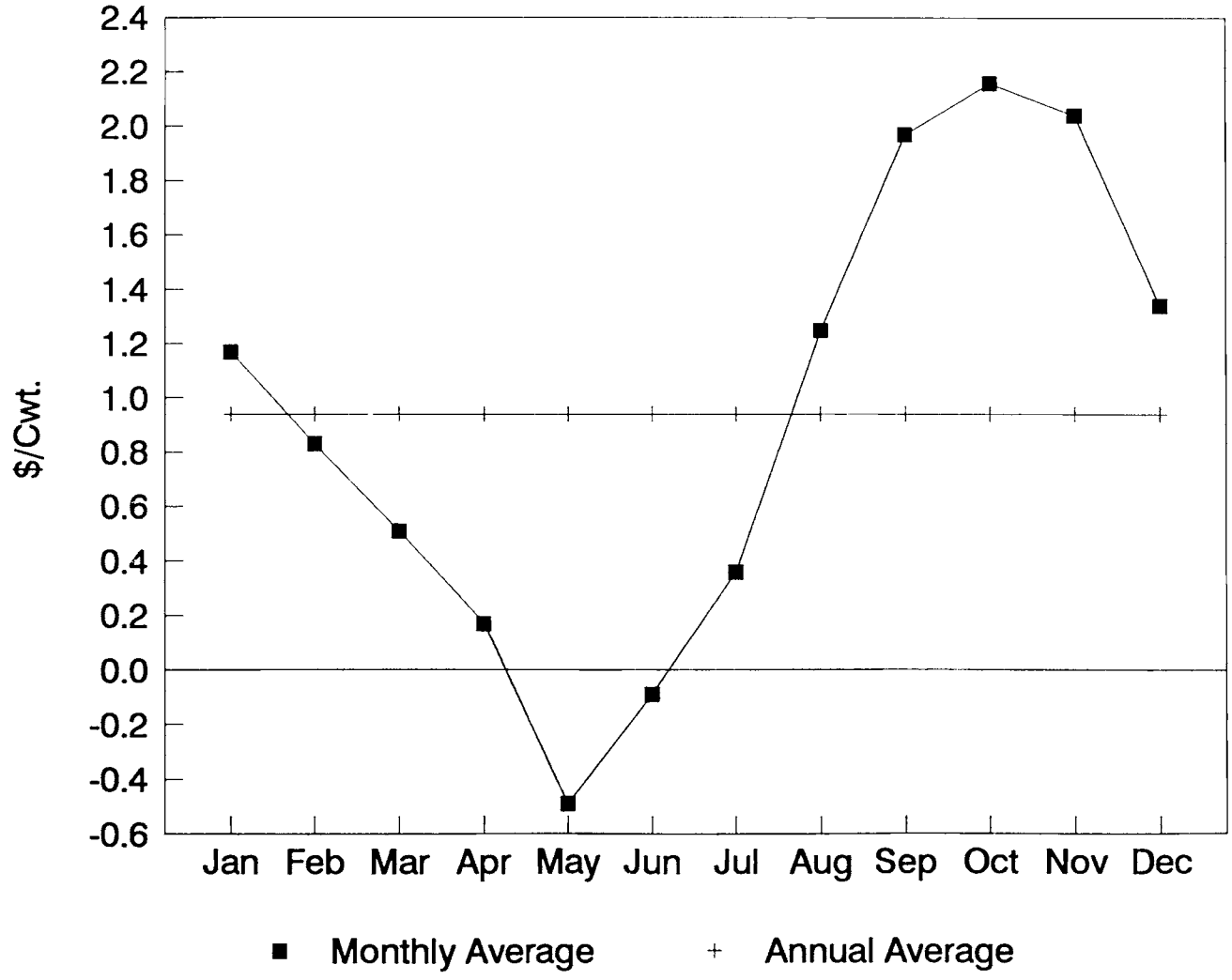


Figure 10. Average By-Product Value for Beef

March 1990 - December 1994

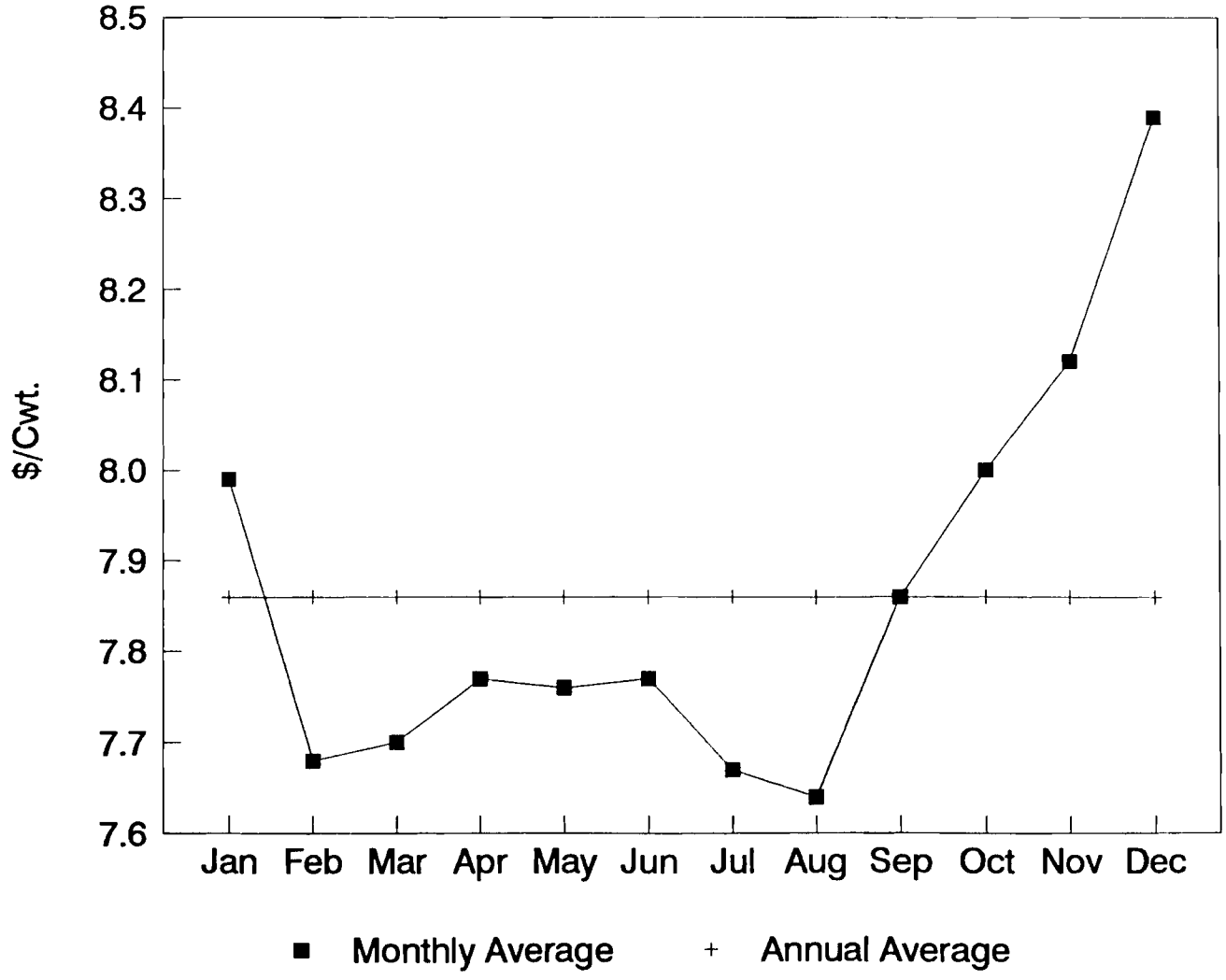


Figure 11. Average Live Weight vs. Live Price for Beef

March 1990 - December 1994

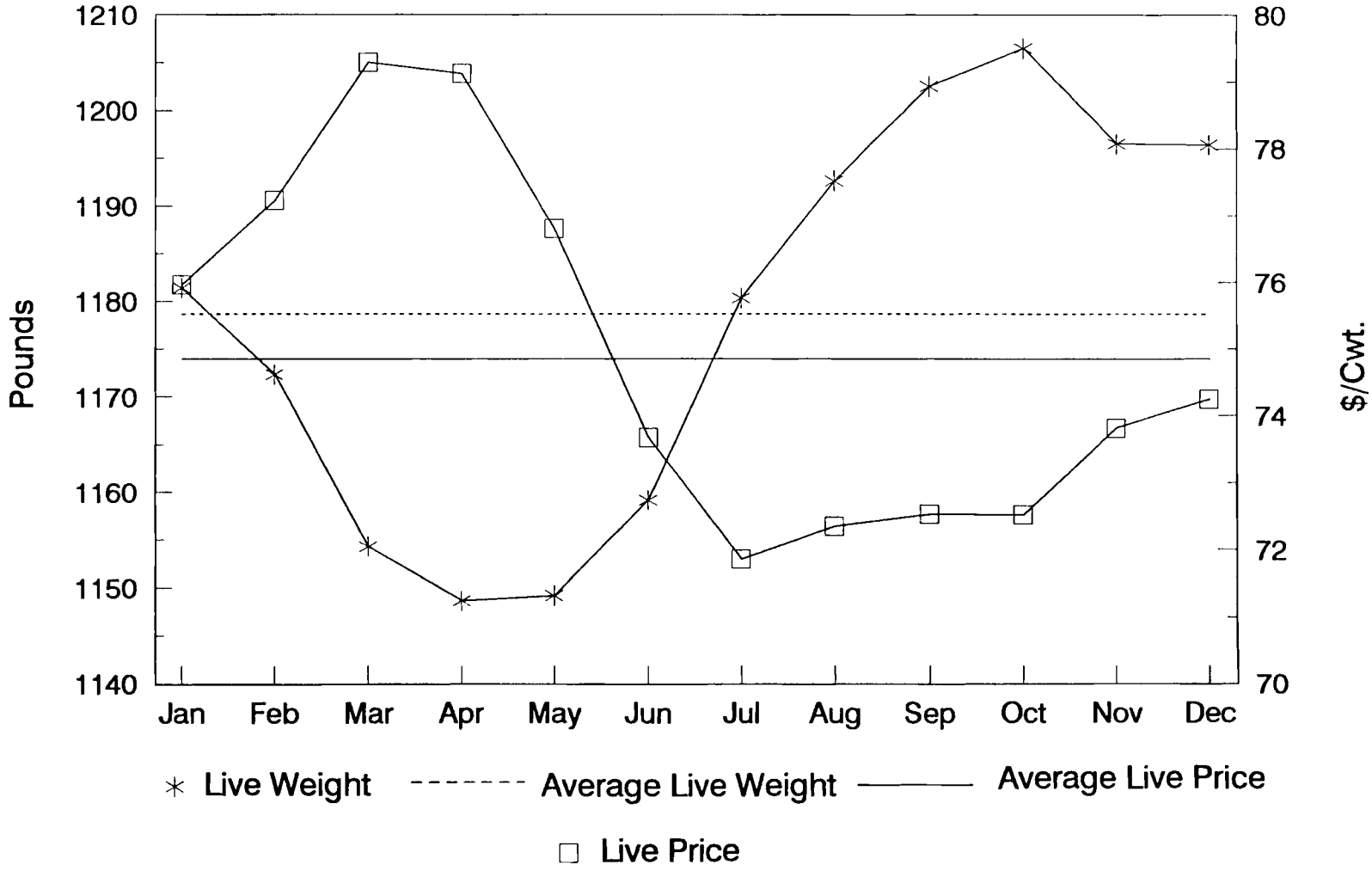


Figure 12. Beef Margins: Differences Between Procedures & Regression

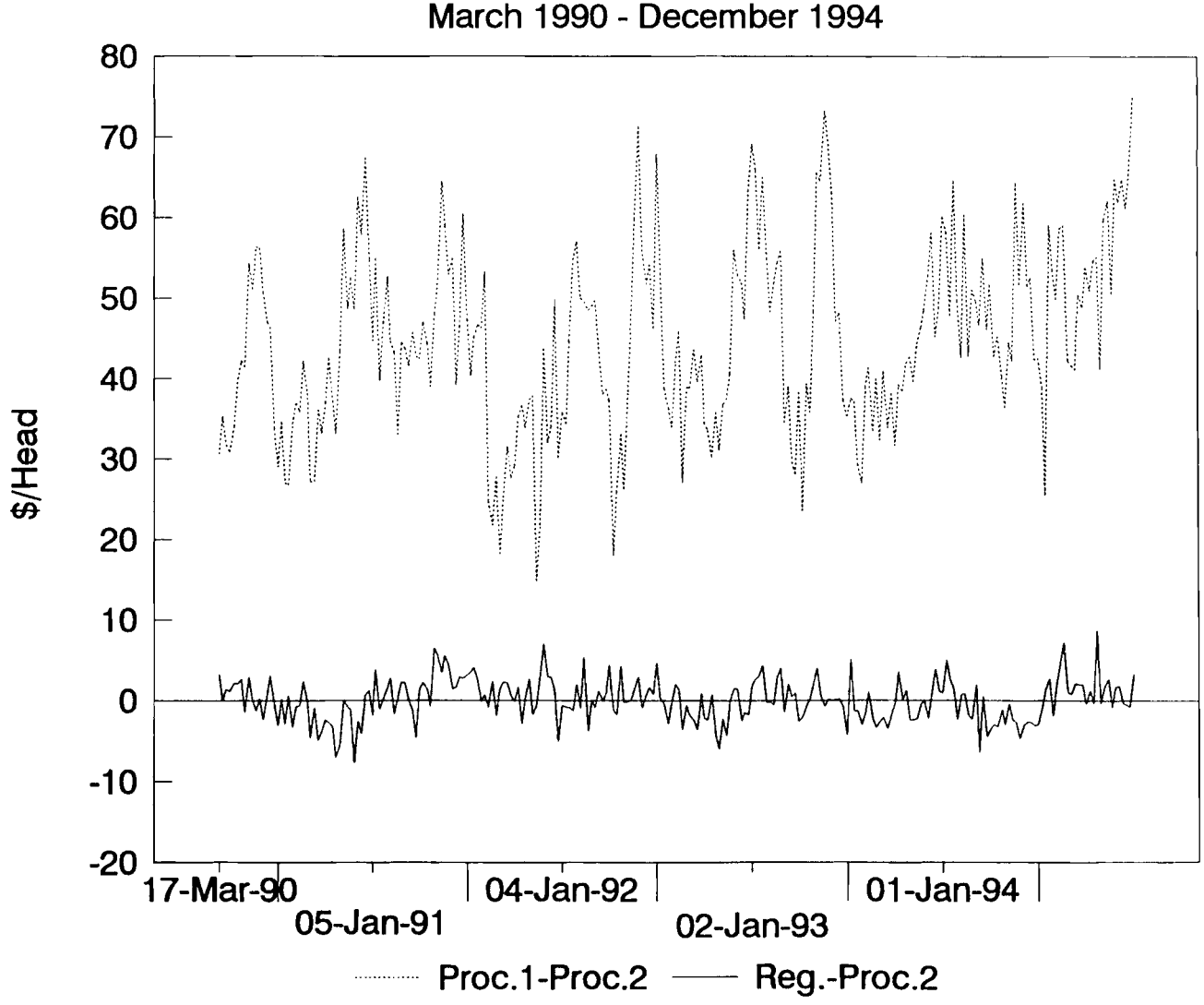


Figure 13. Annual Average Gross Margins for Pork

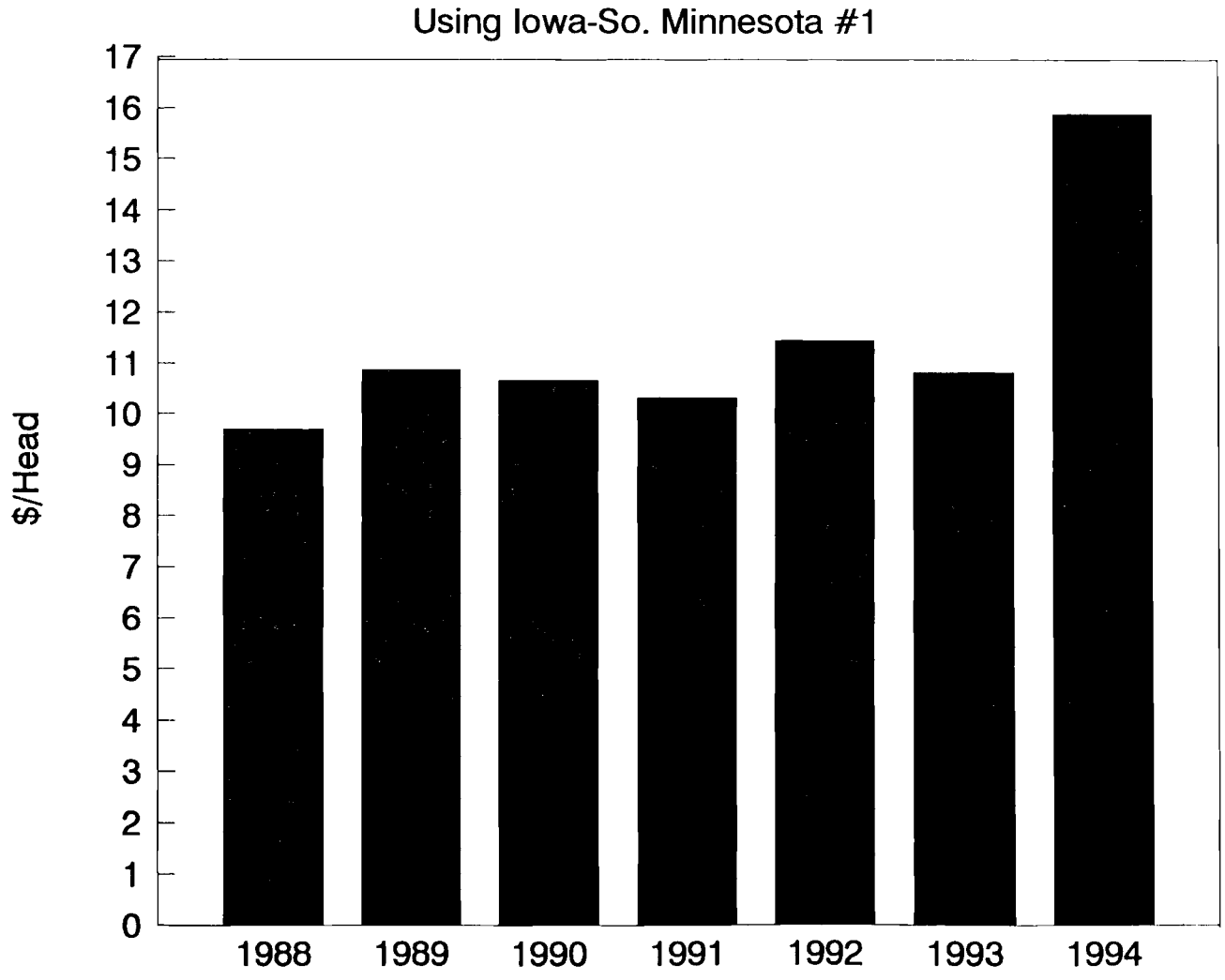
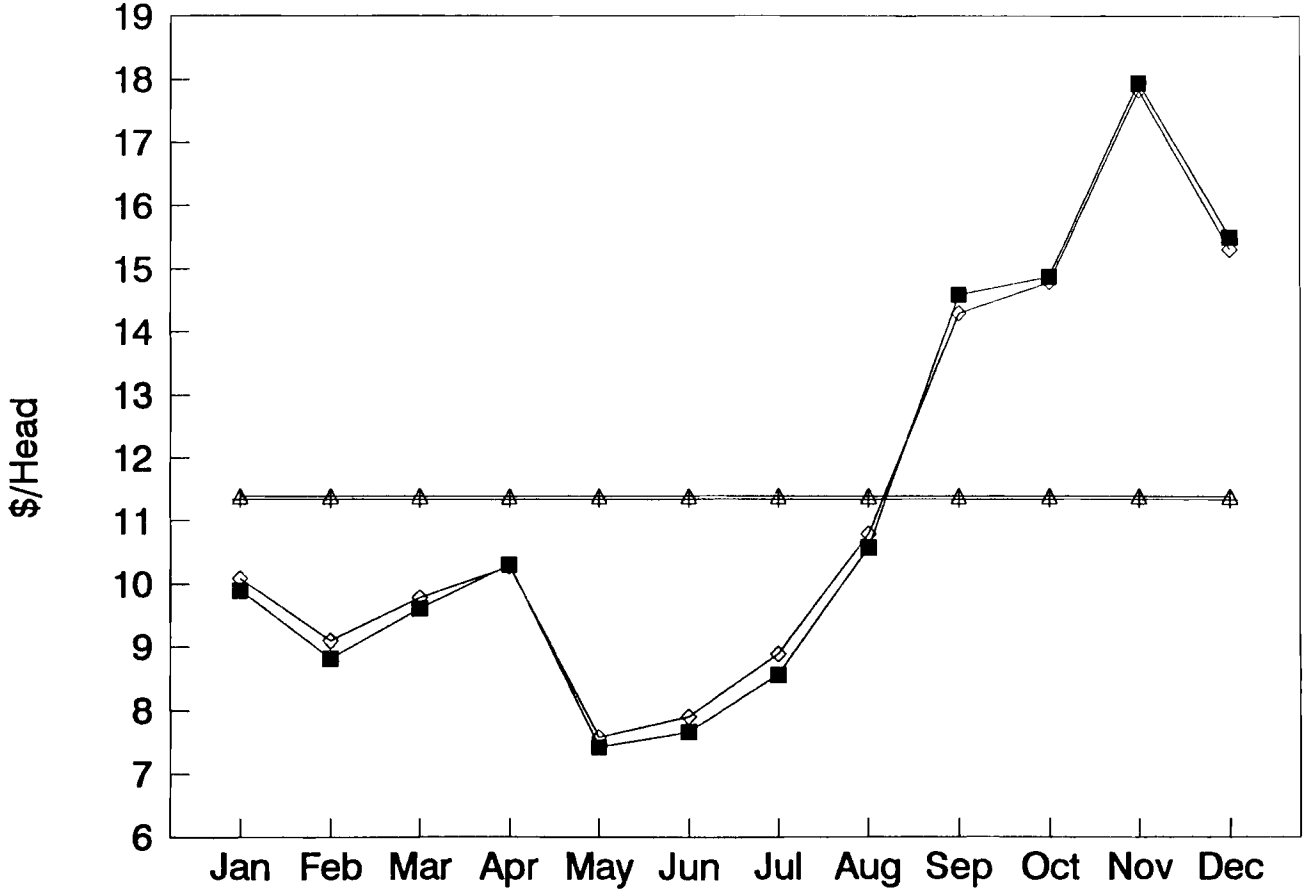


Figure 14. Average Gross Margins for Pork

1988 - 1994

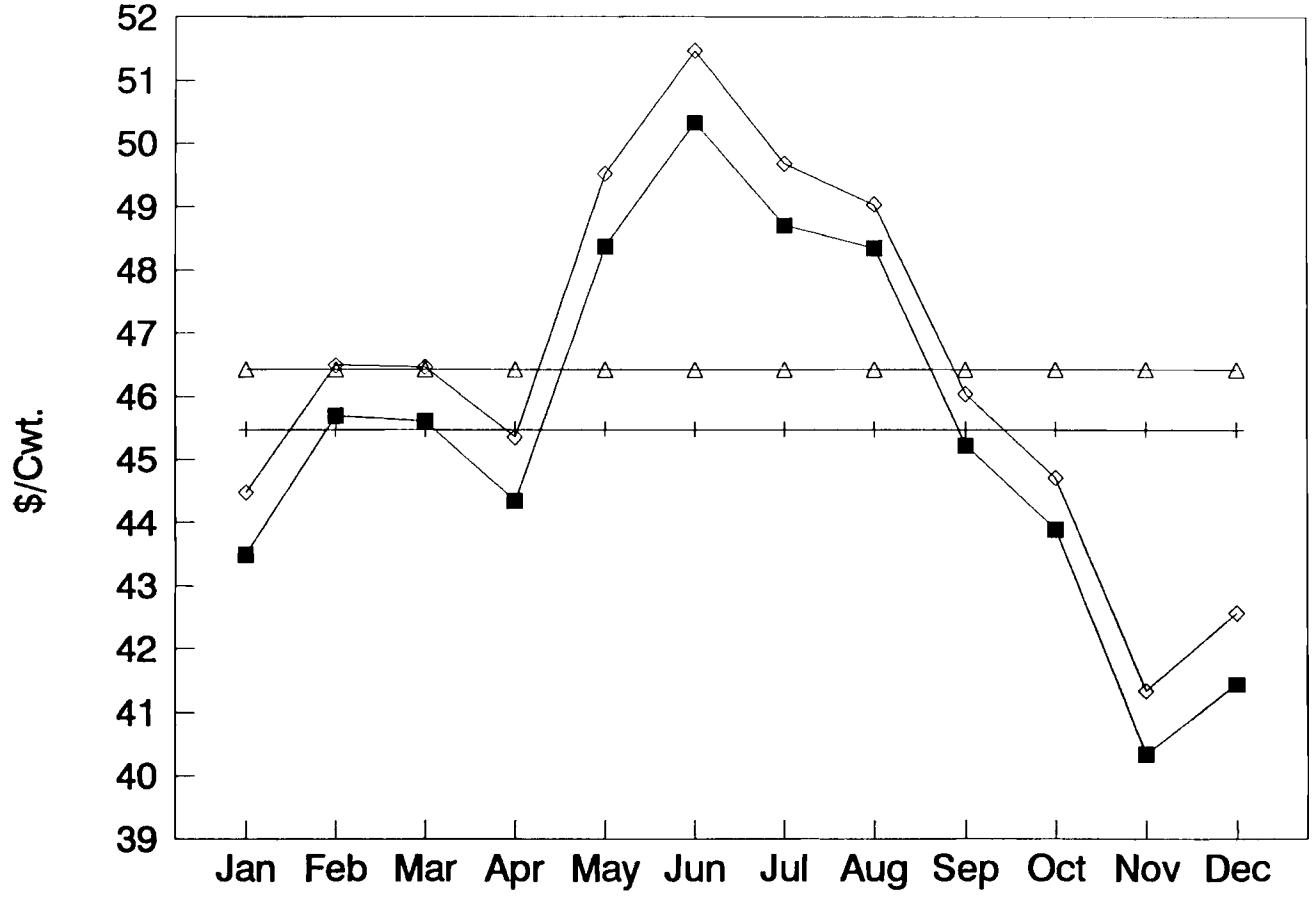


■ 6 Mkt. Monthly Avg. + 6 Mkt. Annual Avg. ◇ Ia-S.MN Monthly Avg.

△ Ia-S.MN Annual Avg.

Figure 15. Average Live Price for Pork

1988 - 1994



■ 6 Mkt. Monthly Avg. + 6 Mkt. Annual Avg. ◇ Ia-S.MN Monthly Avg.

△ Ia-S.MN Annual Avg.

Figure 16. Average Carcass Cutout Values for Pork No. 1 vs. No. 4

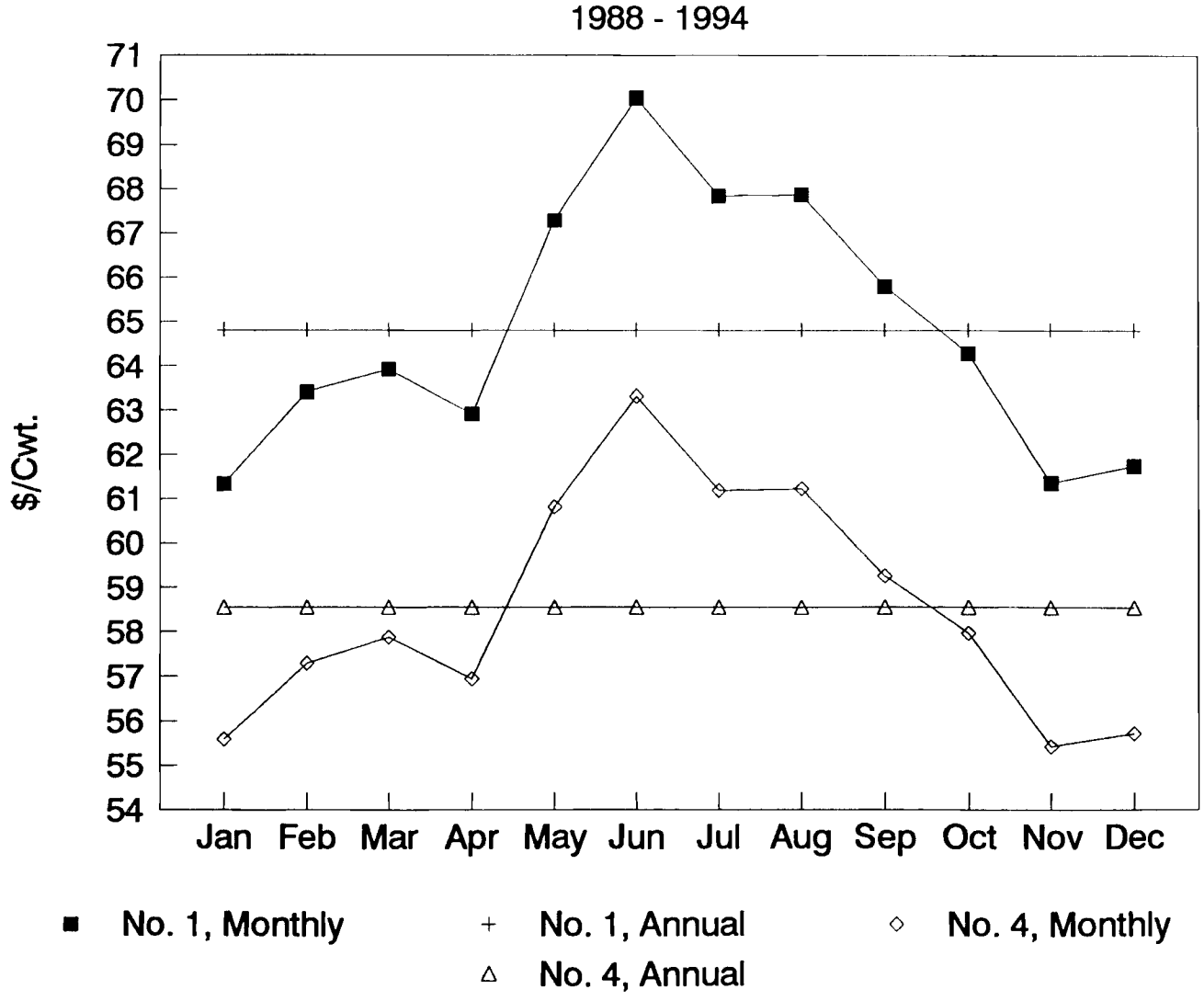


Figure 17. Average Dressed Weight for Pork Carcasses

1988 - 1994

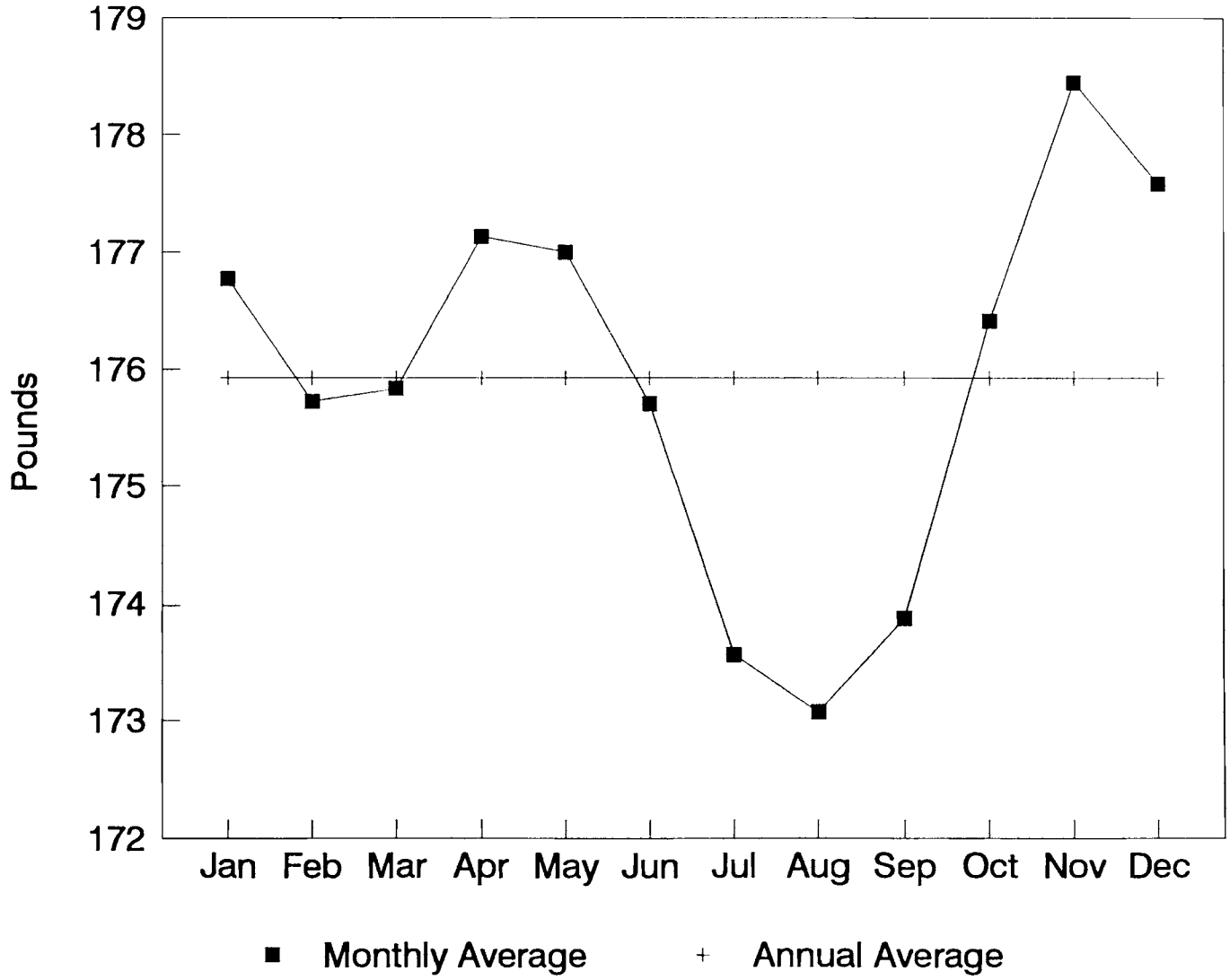


Figure 18. Average Live Weight for Pork

1988 - 1994

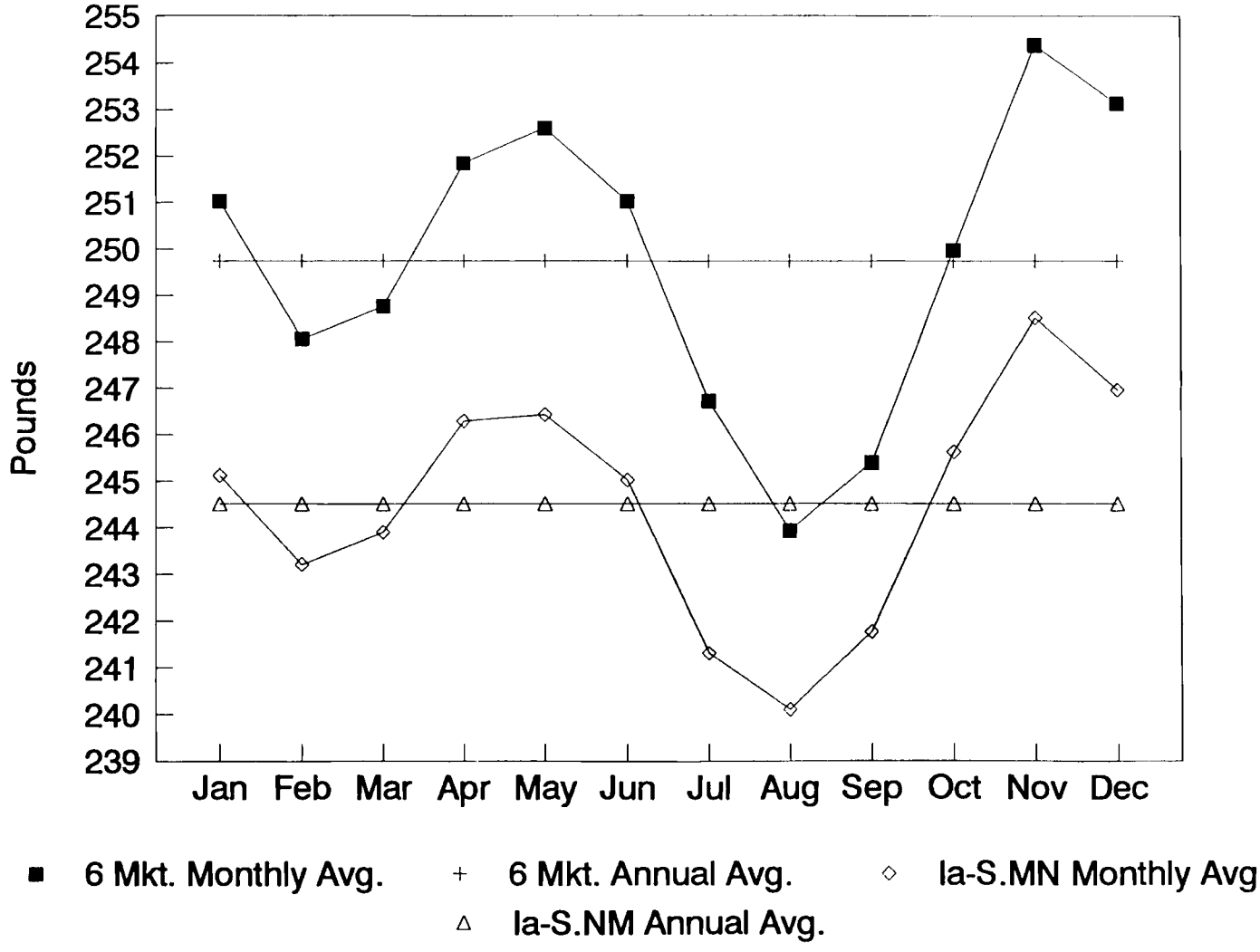


Figure 19. Average By-Product Value for Pork

1988 - 1994

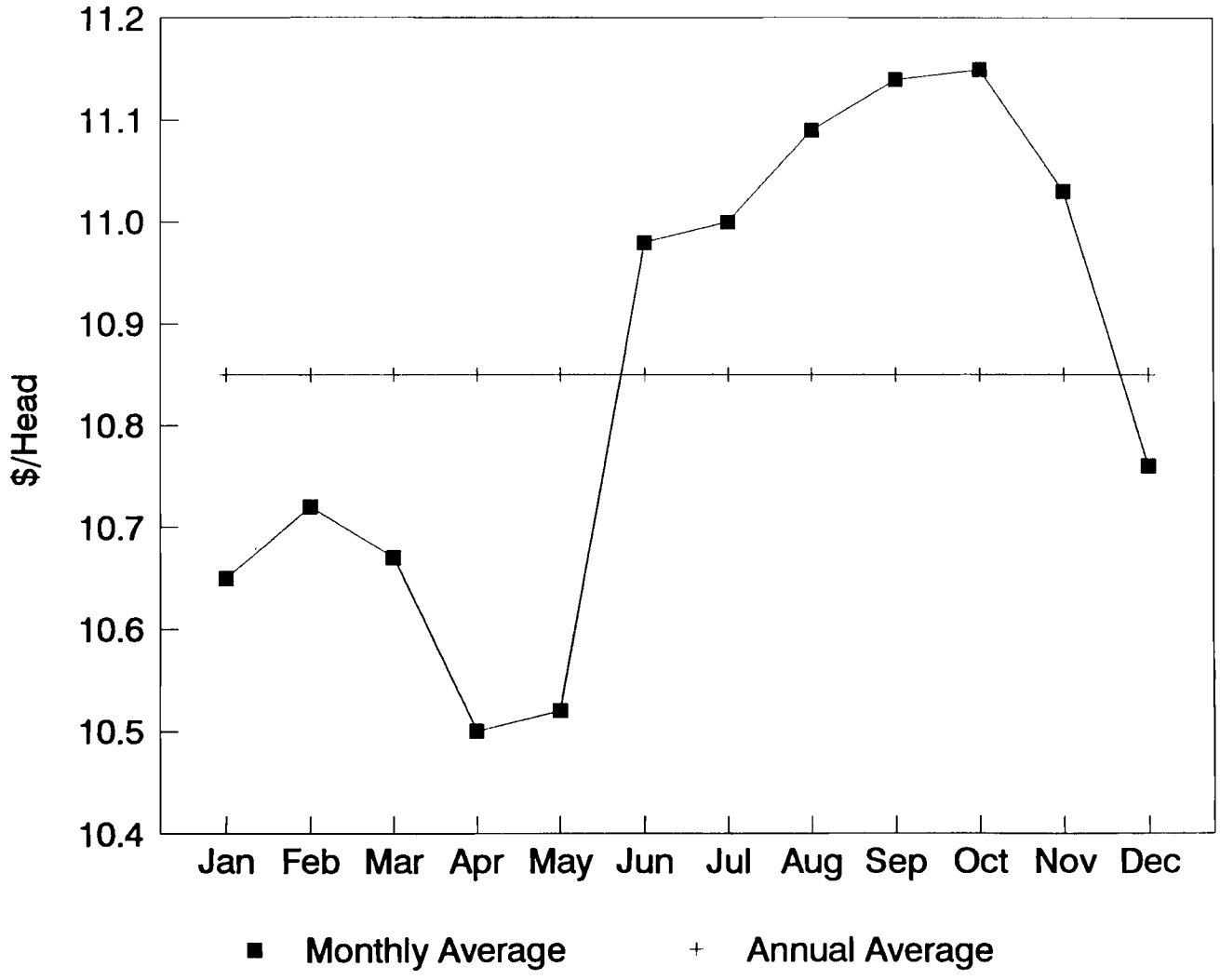


Figure 20. Annual Average Gross Margins for Lamb Using Cutout Values

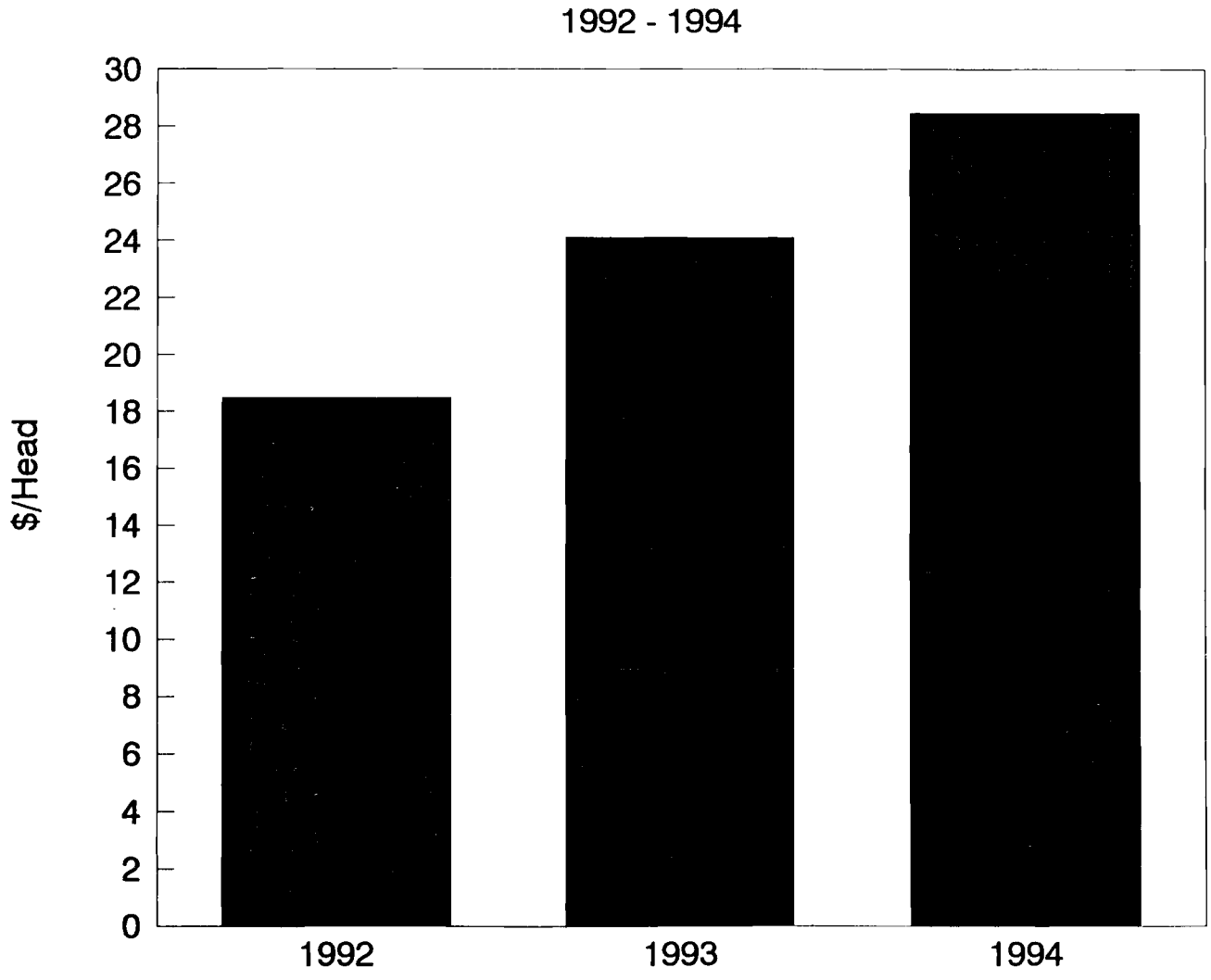


Figure 21. Average Gross Margins for Lamb Using Carcass Prices

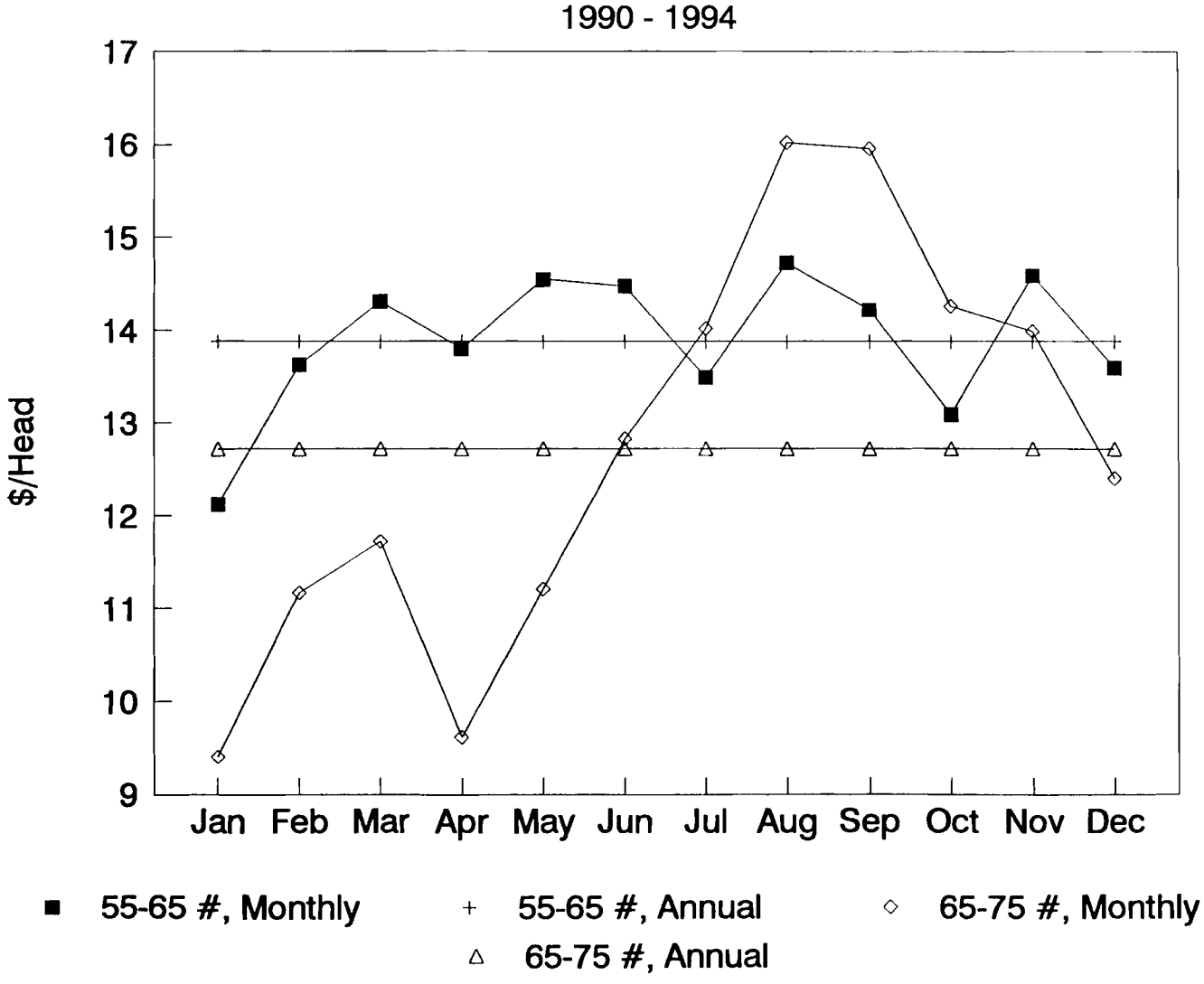


Figure 22. Average Carcass Prices for Lamb

1990 - 1994

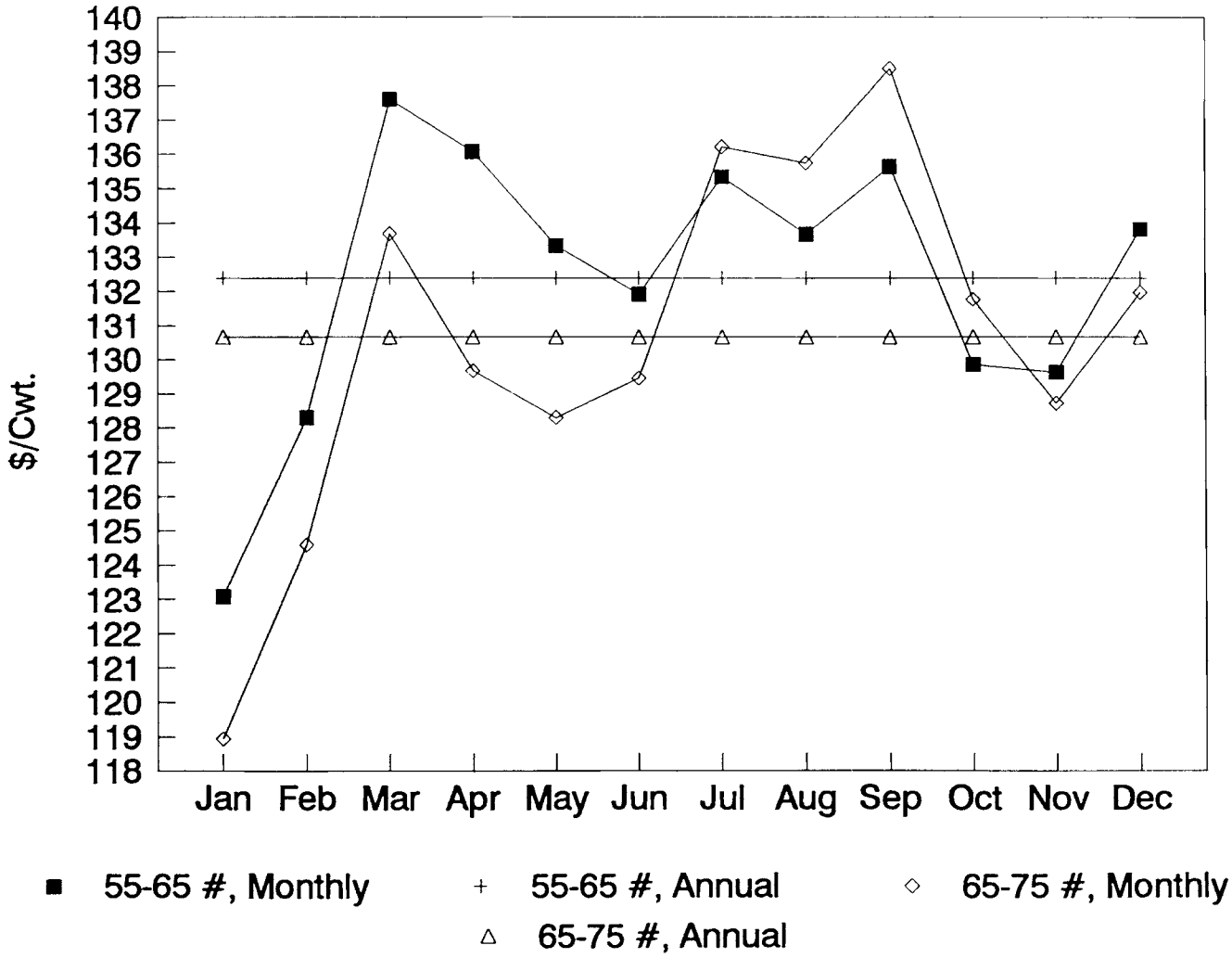


Figure 22. Average Carcass Prices for Lamb

1990 - 1994

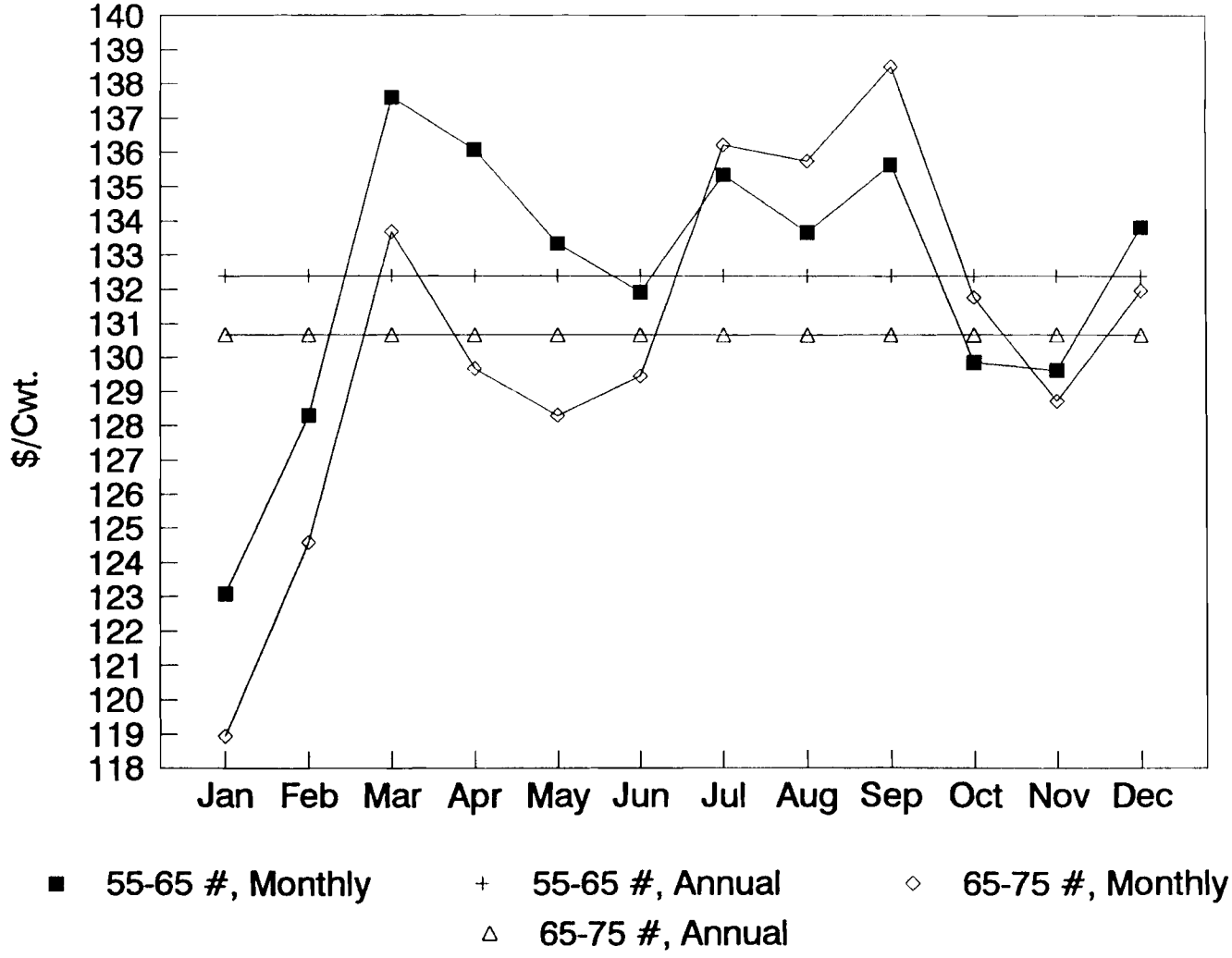


Figure 23. Average Gross Margins for Lambs Using Cutout Values

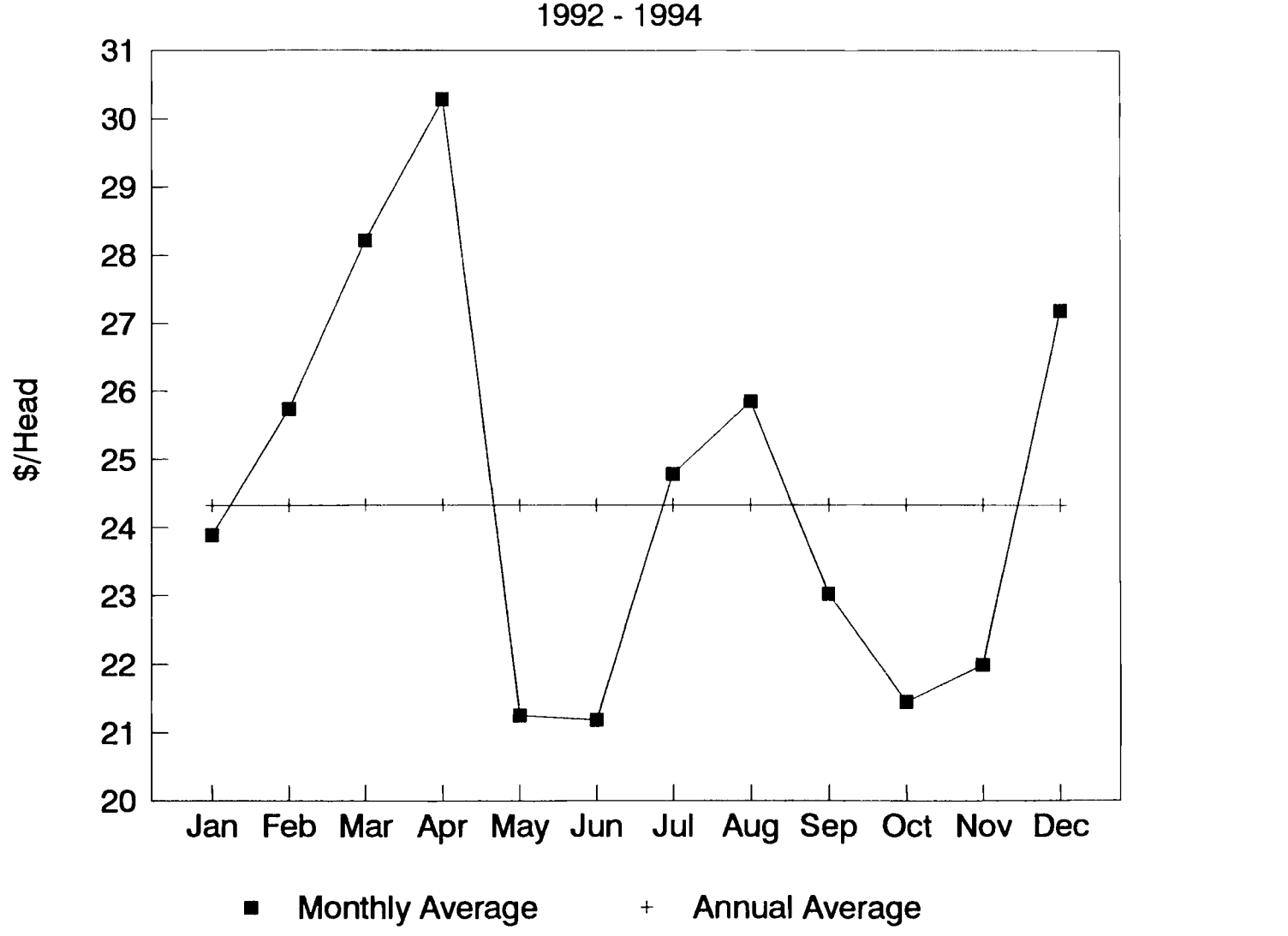
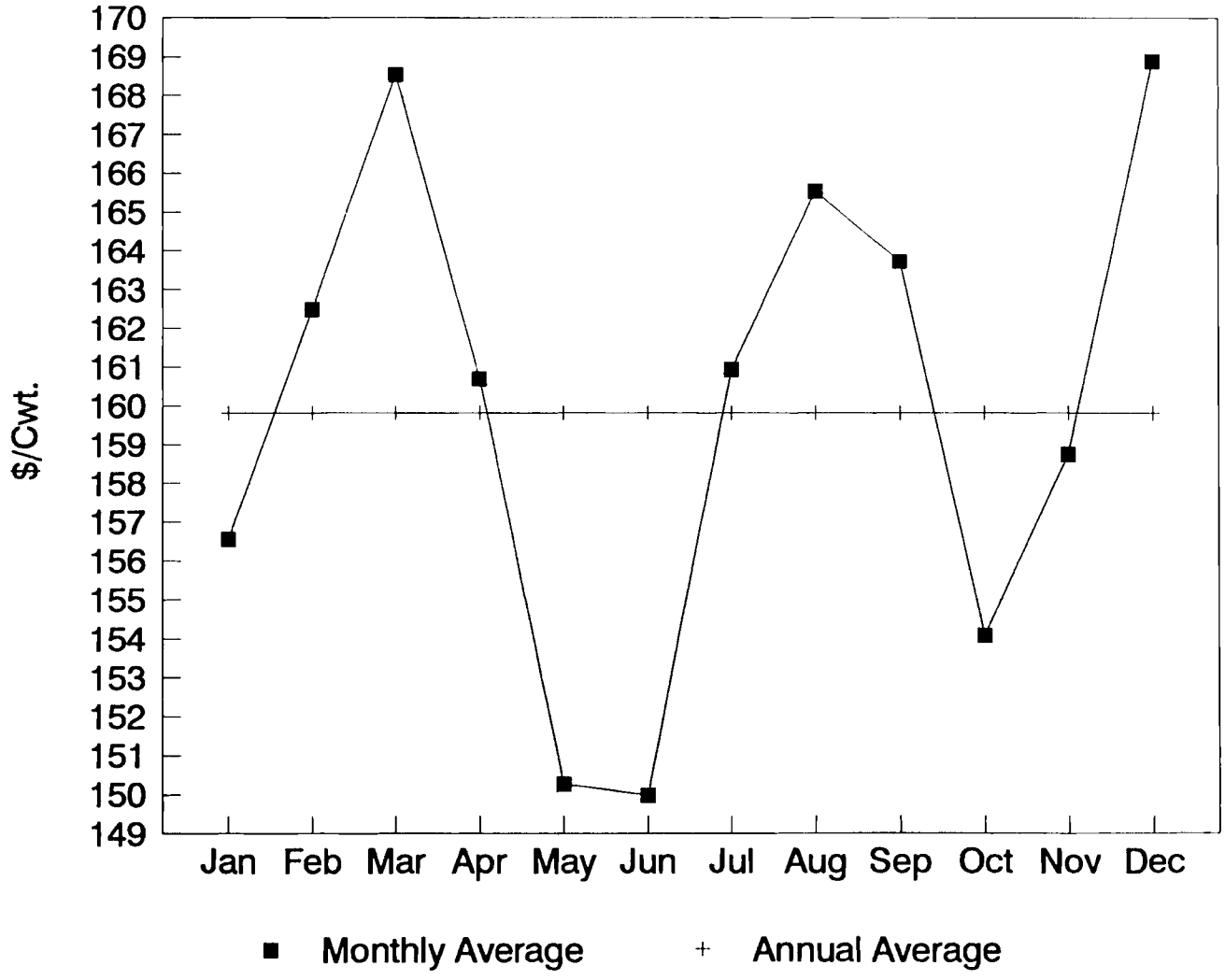


Figure 24. Average Boxed Cutout Values for Lamb

1992 - 1994



CHAPTER 5

SUMMARY AND CONCLUSIONS

5.1 Introduction

The previous chapters discussed literature concerning structure and conduct in the meat packing industry, theory, data, procedures, and results of this research. This chapter summarizes this research, identifying contributions to the body of literature, conclusions drawn from results, and further research opportunities suggested by this research.

5.2 Summary and Conclusions

Much literature has been written concerning how changes in the structure has affected pricing behavior within the meat packing industry. Has the change to fewer, larger meat packers allowed the packers to be able to gain enough market power to noncompetitively influence prices paid for fed cattle? To determine if oligopoly pricing is taking place, a short-run performance measure is needed. Since profitability is the best measure of performance, data need to be available for all portions of revenues received and all costs paid by meat packers. But, public data are not available for costs of processing and fabricating the carcass. So, the next best measure of performance is to calculate gross margins.

The objectives of this research were 1) To develop methodology to estimate gross margins in meat packing for beef, pork, and lamb based on available public market

information and develop a historical gross margin series, 2) Determine the level and variability of gross margins over time, including between-year, within-year, and sex-grade-weight differences, 3) Determine the adequacy of publically available market information for estimating, tracking, and monitoring meat packing industry margins.

5.2.1 Summary and Conclusions for Beef

The first objective of this research was to develop a historical gross margin series. With the beef data that are available, it was possible to calculate gross margins for different buying groups, a weighted steer margin, a weighted heifer margin, a weighted choice margin, a weighted select margin, and an overall weighted beef packer gross margin. The second objective was to determine the level and variability of gross margins. Gross margins for beef are quite volitale due to the many factors which affect them. The strongest determinants of gross margins volatility seem to be the boxed beef cutout values, live prices paid for cattle, live weights, and dressing percentages. From week to week, boxed beef cutout values and live prices usually change in the same direction, but don't necessarily change by the same percentage. For example, if boxed beef cutout values decrease by a larger percentage than do live prices, gross margins will decrease for that week, unless an increase in dressing percentage offsets the decrease in boxed beef cutout values. If dressing percentage increases, then the dressed weight will increase relative to the live weight, which would increase revenue relative to costs, thus possibly allowing gross margins to increase rather than decrease from a larger percentage decrease in boxed beef cutout values. Since by-products values do not change much from week to week, their effect is mostly determined by live weights. Since by-product

value seasonality closely follows the same trend as live weight, its greatest contribution to revenue from September to December. As shown, many factors are affecting gross margins from week to week, and calculating actual gross margins using public data requires many different variables for the equation, but equation (11) can be used to estimate gross margins from week to week.

Concerns remain regarding the level of calculated gross margins, because no prior series has been published to determine whether or not this is a valid level for gross margins. An article by Faminow and Ward has estimated processing and fabricating costs for beef to be approximately $76.50/head, if this is true then the five year annual average of $72.99/head would show that beef packers have not been able to cover variable costs over the five year period, and lost a considerable amount of money from 1992 to 1993. This would indicate that most of these beef packers would not be slaughtering cattle today, so the adequacy issue is questionable for the level of gross margins calculated.

CONAGRA, INC. and IBP, INC. report earning in Cattle Buyers Weekly. IBP's fiscal 1993 report and through 1994 show record earnings. These record earnings will include profits for both beef and pork slaughtering. IBP reported beef profits increasing from 1992's fourth quarter to 1993 near 20 percent. But this study shows gross margins decreasing from 1992 to 1993 for beef, and gross margins below $76.50, which is approximately the breakeven price for beef packers. IBP also reported pork margins decreasing by approximately 30 percent from 1992 to 1993, and calculated gross margins show a decrease of 6.44 percent. These record earnings suggest that estimated gross

margins are too low, and more data are needed to get a better estimate of gross margins.

To get a more precise estimate of the level of gross margins more data are needed. To compute revenue received from all sales of meat, available data does not include boxed beef cutout values or quantities of meat sold for exports. Another portion of revenue, which data are not available on, is prices received for closely trimmed beef, and quantities of closely trimmed beef sold. To compute costs of cattle from all of the cattle slaughtered, data need to be available on captive supply cattle, to get a more precise estimate of the cost of live animals. If this data were available, it would give more precise estimated levels of gross margins.

5.2.2 Summary and Conclusions for Pork

With pork the first objective can be attained, but it is not as detailed as was for beef due to data restrictions. Only estimated margins can be calculated for each grading group using two different live weights and live prices, based on a six market average, and the Iowa-Southern Minnesota. It is more difficult to determine the level and variability of gross margins for pork, because data only allow an estimate of gross margins for each category, but no overall average pork packer gross margin. Gross margins increase from their lowest level in 1988 of $9.46 for six market average and $9.70 for Iowa-Southern Minnesota, to their highest level in 1994 at $15.82 for six market average to $15.89 for Iowa-Southern Minnesota region. Of notable interest is the comparison of the six market average to the Iowa-Southern Minnesota region. From 1988 to 1990 gross margins for Iowa-Southern Minnesota were greater than six market average gross margins, then in 1991, gross margins for six market average became

greater than Iowa-Southern Minnesota gross margins through 1993, and were nearly equal in 1994. The same federally inspected dressed weight is used for both regions since no other dressed weight or dressing percentage is available. Thus, the same revenue will be received in both markets, but different purchase costs will be paid. The change in gross margins between the two regions seems to be associated with the spread in live weight between the six market average and Iowa-Southern Minnesota which was wider from 1988 to 1990, but narrowed from 1991 to 1993. Similarly the spread between prices paid for live animals being wider from 1988 to 1990, and narrowed from 1991 to 1993. There is a question of useful is the data available now? When this study began estimating gross margins, the first data series used a seven market average, next it went to a six market average, and it finally ended as a five market average. Are the markets becoming so thin that the data available now is not worth estimating margins for pork? Because the data available now for pork is adequate if only an idea of what gross margins would be for each grading group, but to calculate an overall pork packer gross margin is to be calculated data need to be available on the proportion of hogs which grade in each group. By not having this data, a regression cannot be used to accurately explain how gross margins will change from week to week.

5.2.3 Summary and Conclusions for Lamb

With the lamb data available, the first objective can be obtained, but again, the gross margins calculated are not as detailed as they were for beef. Gross margins were calculated using carcass value prices for lambs dressing between 55 and 65 lbs., and lambs dressing between 65 and 75 lbs from 1990 to 1994. In 1992, data became

available to calculate gross margins using boxed lamb cutout values. Determining the level and variability of lamb packer gross margins is much tougher, because no estimate of gross margins for each category can be calculated, due to data restrictions.

The difference between using cutout values and carcass values should be the cost of processing the lamb carcass, but evaluating figures 23, 25, 27 shows that the difference between carcass and cutout gross margins do not change by equal amount from week to week. Since these do not change by an equal amount, is there an incentive to sell slaughter lambs either on the rail or already boxed?

5.3 Research Opportunities

To get a better estimate of gross margins in the meat packing industry, all prices received for sales of meat, and all prices paid for costs of purchasing live animal inputs, needs to be included in the equation. For beef, there are different prices received for beef being exported, and the amount being exported would be needed to increase the efficiency of calculating the revenue portion of gross margin equations. It would be hypothesized that export revenues would increase gross margins for meat packers. Also, much meat is now sold on a close trimmed basis, which has a different price, than ones used in this research. Close trimmed meat would also be hypothesized to increase revenue which would increase gross margins for meat packers. Many live cattle are purchased based on different types of marketing agreements. Today, many beef packers have their own feedlot, or contract with independent feedlots, to purchase live cattle. The prices paid for these cattle are not publically reported, which makes it harder to accurately calculate gross margins without these prices paid for live cattle. If this data

were available, the hypothesis would be that cattle purchased by these agreements would decrease the cost of purchasing cattle, which would also increase estimated gross margins. With the data that could be used to get a better estimate gross margins, the efficiency of the estimated gross margins could be increased, and this would allow for monitoring and tracking of beef packers performance. And being able to estimate performance in the meat packing industry is the ultimate issue at hand.

For Pork, much data are needed to have a more efficient estimate of gross margins. Data need to be available on proportions of hogs in each grading group, just to get an estimate of overall pork packer gross margins. Data need to be available on prices and quantities of hogs purchased through marketing agreements. With many hogs being contracted through independent hog feeders. This data would also increase the efficiency of calculating gross margins.

For lamb data needed to have more efficient estimates is the same as what is needed for pork. Data are needed on proportions of lambs in each weight category, to be able to calculate an overall lamb packer gross margin. Many Lamb packers have their own feedlots or contract with independent feedlots to feed out lambs to be slaughtered, prices and quantities for these lambs also need to be publically reported to get an efficient estimate of lamb packer gross margins.

5.4 Contributions to the Body of Literature

This research has given a way to measure performance in the meat packing industry. Although these estimates may not accurately measure the level of gross margins, an econometric model can be used to measure variability from week to week,

without using all of the data needed to calculate beef packer gross margins. But, if better prices and quantities can be included with these gross margins, estimated gross margins could accurately measure performance in the meat packing industry.

Bibliography

Antonovitz, Frances and Terry Roe. "A Theoretical and Empirical Approach to the Value of Information in Risky Markets." *The Review of Economics and Statistics.* 1986:105-114.

Carlton Dennis W. and Jeffrey M. Perloff. *Modern Industrial Organization* (2nd ed.). (1994). HarperCollins College Publishers:331-367.

Connor, John M. "Concentration Issues in the U.S. Beef Subsector." Northeastern Project-165, WP-16. Sep. 1989.

Cowling, K. and M. Waterson. "Price-Cost Margins and Market Structure." *Economica.* 43(1976):267-274.

Faminow, Merle D. and Clement E. Ward. "Competitiveness in the Canadian and United States Beefpacking Industry: The Effects of Free Trade." *Journal of International Food & Agribusiness Marketing.*

Geithman, Frederick E., Bruce W. Marion, and Gwen Quail. "Monopsony Power in an Industry in Disequilibrium: Beef Packing, 1971-1986." University of Wisconson-Madison, Department of Agricultural Economics, WP-96, Dec. 1990.

Gisser, Micha. "Welfare Implications of Oligopoly in U.S. Food Manufacturing." *American Journal of Agricultural Economics.* 64(Nov. 1982):616-624.

Menkhaus, D. J., J. S. St. Clair, and A. Z. Ahmaddaud. "The Effects of Industry Structure on Price: A Case in the Beef Industry." *Western Journal of Agricultural Economics.* 6(1981):147-153.

Mullen, John D., Michael K. Wohlgenant, and Ronald E. Farris. "Input Substitution and the Distribution of Surplus Gains from Lower U.S. Beef-Processing Costs." *American Journal of Agricultural Economics.* 70(May 1988):245-254.

Preckel, Paul V., Edna T. Loehman, and Michael S. Kaylen. "The Value of Public Information for Microeconomic Production Decisions." *Western Journal of Agricultural Economics.* 12(1987):193-197.

Purcell, Wayne D. "Structural Change in the Livestock Sector: Causes, Implications, Continuing Issues." *Structural Change in Livestock: Causes, Implications, Alternatives.* ed. Wayne D. Purcell, Blacksburg, Virginia: Research Institute on Livestock Pricing, February 1990a.

Purcell, Wayne D. "Economics of Consolidation in the Beef Sector: Research Challenges." *American Journal of Agricultural Economics.* 72(December 1990b):1210-1218.

Schroeter, John R. "Estimating the Degree of Market Power in the Beef Packing Industry." *The Review of Economics and Statistics.* (July, 1987)158-162.

Tomek, William G. and Kenneth L. Robinson. *Agricultural Product Prices* (3rd ed.). (1990). Cornell University Press:140-141.

U.S. Department of Agriculture. *Livestock, Meat, Wool Market News* Report Washington D.C.: Agricultural Marketing Service, January 1988 through December 1994.

Ward, Clement E. "Inter-Firm Differences in Fed Cattle Prices in the Southern Plains." *American Journal of Agricultural Economics.* 74(May 1992a):480-484.

Ward, Clement E. "Meatpacking Industry Changes: Causes and Consequences." A.E. Paper 92137, Department of Agricultural Economics, Oklahoma State University. (December 1992b):1-4.

Ward, Clement E. "Meatpacking Competition and Pricing." *Research Institute on Livestock Pricing.* (July, 1988)168-174.

Ward, Clement E. "Productivity-Concentration Relationship in the U.S. Meatpacking Industry." *Southern Journal of Agricultural Economics.* 19(Dec. 1987):217-222.

APPENDIXES

APPENDIX A

Calculated Gross Margins for Beef ($/Head).

	Steer & Heifer	Steer	Heifer	Average Choice	Average Select
17-Mar-90	78.75	80.52	75.32	85.75	63.28
24-Mar-90	83.27	84.54	81.18	90.97	67.40
31-Mar-90	75.14	75.94	73.62	81.81	61.08
07-Apr-90	65.07	65.30	64.47	71.73	50.90
14-Apr-90	69.07	68.70	69.60	76.37	54.82
21-Apr-90	81.19	78.91	85.48	93.14	60.41
28-Apr-90	85.98	84.39	88.65	101.25	58.46
05-May-90	89.57	88.40	91.37	106.37	56.45
12-May-90	95.56	98.84	89.41	116.24	55.30
19-May-90	107.92	111.29	102.36	132.51	65.27
26-May-90	105.19	106.98	102.15	130.85	58.65
02-Jun-90	100.58	106.20	92.37	124.78	52.76
09-Jun-90	95.50	97.22	92.79	118.91	48.98
16-Jun-90	93.81	97.99	88.27	113.99	54.58
23-Jun-90	87.34	90.80	82.29	101.50	58.44
30-Jun-90	99.54	101.68	96.04	111.90	74.09
07-Jul-90	101.26	101.35	101.11	113.72	78.04
14-Jul-90	97.21	103.98	89.55	110.74	70.82
21-Jul-90	96.25	98.11	93.41	107.87	72.85
28-Jul-90	87.09	91.52	79.59	98.89	62.07
04-Aug-90	86.83	90.72	81.27	101.47	55.99
11-Aug-90	94.55	100.72	83.79	109.67	61.33
18-Aug-90	85.83	89.88	80.40	101.41	54.65
25-Aug-90	84.40	90.40	77.78	97.48	55.12
01-Sep-90	86.92	87.81	85.42	99.35	60.09
08-Sep-90	95.71	95.40	96.11	108.14	69.57
15-Sep-90	78.92	79.80	77.75	90.63	53.99
22-Sep-90	79.66	74.93	85.69	93.78	49.10
29-Sep-90	90.80	92.10	89.31	106.79	57.59
06-Oct-90	79.87	78.48	81.36	98.53	41.54
13-Oct-90	84.07	85.74	81.70	104.48	46.20
20-Oct-90	81.73	80.79	83.08	102.91	43.66
27-Oct-90	93.69	91.60	96.42	116.79	52.65
03-Nov-90	93.70	91.46	96.53	117.47	49.55
10-Nov-90	80.64	82.74	77.68	105.89	39.79
17-Nov-90	89.64	92.47	85.13	113.06	47.63
24-Nov-90	91.33	94.05	86.89	118.70	46.63
01-Dec-90	85.03	78.53	94.26	114.81	34.82

APPENDIX A (Continued)

Calculated Gross Margins for Beef ($/Head)

08-Dec-90	86.54	85.75	87.65	117.90	34.21
15-Dec-90	92.81	92.43	93.32	121.92	38.53
22-Dec-90	82.06	78.55	86.85	110.17	34.14
29-Dec-90	73.51	70.47	79.69	96.50	29.50
05-Jan-91	76.54	70.34	84.26	97.98	40.74
12-Jan-91	79.14	76.52	82.86	93.08	55.34
19-Jan-91	97.91	93.75	104.92	107.11	81.16
26-Jan-91	87.08	82.49	94.02	92.84	75.74
02-Feb-91	81.58	78.47	86.12	88.71	68.24
09-Feb-91	77.46	76.01	79.30	84.69	64.95
16-Feb-91	80.84	76.29	87.93	88.22	66.38
23-Feb-91	79.89	79.88	79.90	87.53	65.06
02-Mar-91	72.41	71.82	73.31	80.95	59.07
09-Mar-91	77.01	76.75	77.40	87.62	60.69
16-Mar-91	66.28	62.16	71.97	78.61	47.90
23-Mar-91	58.12	51.88	68.38	72.55	36.64
30-Mar-91	73.77	63.04	87.69	87.34	55.41
06-Apr-91	63.69	61.08	68.30	75.92	44.55
13-Apr-91	66.98	65.99	68.46	82.08	47.03
20-Apr-91	72.32	69.25	77.48	87.84	51.60
27-Apr-91	82.12	78.18	88.84	99.89	59.94
04-May-91	71.50	70.57	73.06	90.40	46.48
11-May-91	68.14	70.58	64.25	89.48	40.14
18-May-91	70.30	70.48	69.98	93.41	41.59
25-May-91	77.50	80.54	72.45	101.40	49.01
01-Jun-91	79.12	81.36	75.85	101.83	51.14
08-Jun-91	85.09	85.62	84.41	106.96	56.29
15-Jun-91	107.18	109.63	103.44	128.45	79.78
22-Jun-91	98.12	100.22	95.05	118.89	71.57
29-Jun-91	102.00	104.11	98.64	122.56	76.00
06-Jul-91	89.04	91.52	85.33	107.32	64.74
13-Jul-91	80.04	82.25	76.36	97.02	56.37
20-Jul-91	85.55	91.02	77.61	102.38	61.81
27-Jul-91	78.79	77.82	80.39	94.12	57.08
03-Aug-91	99.40	98.93	100.19	116.18	77.28
10-Aug-91	118.13	119.49	115.77	132.72	98.70
17-Aug-91	133.27	133.94	132.10	144.85	117.55
24-Aug-91	100.06	101.89	97.21	110.33	85.28
31-Aug-91	106.32	103.13	110.92	114.78	95.02
07-Sep-91	111.32	112.60	108.78	121.25	98.86
14-Sep-91	84.48	84.15	84.96	95.49	69.31

APPENDIX A (Continued)

Calculated Gross Margins for Beef ($/Head)

21-Sep-91	96.81	98.35	94.93	109.57	80.58
28-Sep-91	78.75	78.13	79.55	92.82	58.95
05-Oct-91	76.34	73.34	81.21	91.66	54.21
12-Oct-91	88.10	88.47	87.50	107.56	62.79
19-Oct-91	87.35	83.75	91.92	109.45	56.27
26-Oct-91	92.06	95.00	87.96	112.21	62.58
02-Nov-91	93.19	96.97	87.79	110.50	69.56
09-Nov-91	80.79	77.30	86.77	95.45	60.85
16-Nov-91	80.07	78.05	83.57	91.96	64.41
23-Nov-91	80.62	84.53	74.26	90.93	67.71
30-Nov-91	72.34	77.69	63.81	81.03	61.29
07-Dec-91	70.11	72.13	66.68	78.70	58.45
14-Dec-91	78.52	81.79	73.51	86.32	68.71
21-Dec-91	96.45	96.85	95.87	105.46	85.66
28-Dec-91	110.10	105.95	117.12	120.23	97.83
04-Jan-92	90.22	90.62	89.49	101.20	76.42
11-Jan-92	77.37	76.34	78.63	87.08	65.72
18-Jan-92	79.05	77.68	80.83	93.46	61.79
25-Jan-92	75.69	73.24	78.91	90.28	56.31
01-Feb-92	66.15	66.55	65.51	81.62	46.22
08-Feb-92	71.69	71.03	72.58	87.81	50.81
15-Feb-92	70.26	75.54	62.01	84.58	51.68
22-Feb-92	78.06	72.39	85.15	89.22	62.86
29-Feb-92	68.90	66.76	72.38	78.81	57.44
07-Mar-92	64.58	63.22	67.03	73.54	53.44
14-Mar-92	53.35	53.31	53.39	62.09	42.66
21-Mar-92	64.86	64.34	65.87	71.67	56.97
28-Mar-92	62.21	60.81	64.59	66.29	57.39
04-Apr-92	48.26	46.94	50.72	53.52	41.81
11-Apr-92	44.31	40.76	50.50	49.12	38.70
18-Apr-92	62.44	59.75	67.47	68.73	55.36
25-Apr-92	68.70	71.22	63.92	77.79	56.88
02-May-92	56.62	54.05	61.40	65.87	45.68
09-May-92	62.13	61.71	62.82	72.67	49.72
16-May-92	60.88	59.99	62.41	76.76	41.47
23-May-92	76.93	80.11	72.76	106.82	40.96
30-May-92	78.43	85.53	65.98	115.02	33.81
06-Jun-92	71.20	70.05	73.26	107.00	29.93
13-Jun-92	74.99	77.28	70.86	106.04	37.68
20-Jun-92	78.43	80.39	75.31	104.00	50.03
27-Jun-92	75.22	74.83	75.89	94.44	52.92

APPENDIX A (Continued)

Calculated Gross Margins for Beef ($/Head)

04-Jul-92	45.75	47.88	43.45	60.49	21.12
11-Jul-92	59.11	59.63	58.14	77.12	38.04
18-Jul-92	63.86	64.94	61.81	80.80	43.28
25-Jul-92	68.70	66.16	72.54	86.23	48.19
01-Aug-92	70.79	72.09	68.00	86.00	53.00
08-Aug-92	63.44	66.73	57.71	77.91	45.57
15-Aug-92	64.13	67.85	58.23	79.66	47.30
22-Aug-92	78.04	75.52	82.77	92.86	61.54
29-Aug-92	61.65	58.76	66.08	75.71	46.82
05-Sep-92	60.18	56.18	67.06	72.61	45.38
12-Sep-92	60.77	58.29	65.11	72.65	46.31
19-Sep-92	63.51	59.89	69.26	76.07	48.48
26-Sep-92	58.67	57.78	60.02	73.61	42.58
03-Oct-92	67.36	65.19	70.88	80.83	50.59
10-Oct-92	66.08	63.04	71.34	78.96	52.02
17-Oct-92	58.96	58.20	60.26	73.99	41.86
24-Oct-92	56.54	51.58	64.73	71.32	39.46
31-Oct-92	54.57	45.77	68.60	67.66	37.63
07-Nov-92	60.54	57.52	66.10	74.64	45.12
14-Nov-92	55.42	46.79	72.02	69.02	40.30
21-Nov-92	57.65	54.58	63.38	69.54	45.34
28-Nov-92	50.17	47.19	56.50	62.85	36.08
05-Dec-92	44.02	41.72	47.64	58.60	27.26
12-Dec-92	56.23	50.57	65.58	71.06	40.36
19-Dec-92	72.28	71.27	74.16	86.41	56.72
26-Dec-92	79.16	83.96	71.43	91.01	57.74
02-Jan-93	68.04	67.84	68.42	85.33	49.37
09-Jan-93	59.06	59.00	59.16	72.15	44.15
16-Jan-93	58.40	58.00	59.09	73.97	41.94
23-Jan-93	55.46	55.68	55.06	66.87	43.08
30-Jan-93	63.28	61.20	68.23	71.70	52.01
06-Feb-93	52.35	47.52	61.28	60.41	43.79
13-Feb-93	49.95	47.48	54.55	58.30	41.35
20-Feb-93	36.03	35.80	36.69	43.50	28.25
27-Feb-93	41.96	39.50	46.90	48.80	34.34
06-Mar-93	56.00	54.43	59.73	62.01	49.99
13-Mar-93	40.63	42.36	37.32	46.05	34.98
20-Mar-93	50.29	47.93	55.08	57.05	43.00
27-Mar-93	42.67	40.53	46.90	50.10	35.10
03-Apr-93	51.10	46.35	62.01	59.22	42.60
10-Apr-93	48.47	42.09	59.91	55.88	40.48

APPENDIX A (Continued)

Calculated Gross Margins for Beef ($/Head)

17-Apr-93	42.37	36.42	54.07	54.35	30.33
24-Apr-93	62.26	59.93	66.73	78.58	46.14
01-May-93	68.64	68.66	68.60	90.90	45.22
08-May-93	52.50	52.89	51.76	85.83	17.05
15-May-93	53.90	52.14	56.73	91.88	12.73
22-May-93	50.59	46.31	56.91	89.65	11.43
29-May-93	50.33	48.28	53.63	85.79	11.33
05-Jun-93	66.19	63.52	71.58	99.97	31.07
12-Jun-93	58.84	59.68	57.51	83.75	31.51
19-Jun-93	52.28	50.94	54.85	72.73	29.09
26-Jun-93	66.62	64.94	69.51	82.40	49.00
03-Jul-93	61.72	56.43	70.90	74.98	46.64
10-Jul-93	59.52	68.11	46.38	72.50	44.92
17-Jul-93	59.80	56.72	64.31	71.78	46.49
24-Jul-93	73.80	71.50	77.21	85.32	61.31
31-Jul-93	67.96	64.49	73.63	80.58	53.57
07-Aug-93	50.88	46.95	57.65	63.61	35.83
14-Aug-93	53.41	51.17	57.25	67.09	38.07
21-Aug-93	74.49	68.33	84.88	85.31	59.93
28-Aug-93	78.86	71.83	91.32	89.86	66.43
04-Sep-93	72.59	66.56	81.95	81.23	62.81
11-Sep-93	62.23	57.73	69.33	70.15	52.86
18-Sep-93	65.22	56.56	76.48	74.73	53.91
25-Sep-93	69.97	63.17	80.66	79.71	59.03
02-Oct-93	80.10	78.50	82.75	89.46	70.04
09-Oct-93	57.82	57.39	58.47	68.16	45.99
16-Oct-93	76.41	74.47	79.81	88.25	63.34
23-Oct-93	59.38	57.86	61.86	72.92	43.32
30-Oct-93	41.26	34.25	52.03	55.28	26.52
06-Nov-93	46.65	39.75	57.91	61.23	29.77
13-Nov-93	62.92	58.50	68.82	77.13	46.16
20-Nov-93	65.62	61.28	71.35	79.91	50.02
27-Nov-93	67.93	64.80	72.01	81.03	52.91
04-Dec-93	60.01	52.69	69.93	73.73	43.47
11-Dec-93	41.83	35.47	52.10	54.40	27.55
18-Dec-93	34.19	31.93	37.72	46.50	20.27
25-Dec-93	31.65	25.99	39.48	44.89	17.32
01-Jan-94	51.60	49.24	56.05	65.23	35.59
08-Jan-94	48.70	49.80	46.94	61.22	34.73
15-Jan-94	60.83	60.46	61.34	72.68	47.67
22-Jan-94	66.63	64.84	69.13	75.65	56.50

APPENDIX A (Continued)

Calculated Gross Margins for Beef ($/Head)

29-Jan-94	57.42	50.05	70.69	65.87	48.13
05-Feb-94	55.69	52.82	59.99	63.16	47.06
12-Feb-94	61.91	59.43	66.05	71.56	51.28
19-Feb-94	57.85	52.03	65.91	65.94	48.92
26-Feb-94	69.52	68.41	71.18	78.18	60.20
05-Mar-94	53.53	53.89	53.00	63.42	42.58
12-Mar-94	59.12	47.73	75.50	69.08	48.47
19-Mar-94	54.55	51.42	59.43	65.32	42.85
26-Mar-94	64.24	57.36	73.65	73.26	54.37
02-Apr-94	57.89	52.46	67.41	65.48	49.81
09-Apr-94	50.17	43.96	60.60	56.36	43.39
16-Apr-94	58.45	54.40	66.13	66.78	50.01
23-Apr-94	71.16	69.39	75.01	78.85	62.64
30-Apr-94	71.58	69.20	76.36	81.01	61.14
07-May-94	68.24	66.61	71.09	78.35	57.13
14-May-94	81.54	79.27	85.80	97.51	64.63
21-May-94	79.67	77.42	84.50	98.05	58.78
28-May-94	97.61	95.55	101.50	115.03	78.29
04-Jun-94	80.01	77.97	83.41	98.08	59.98
11-Jun-94	110.53	111.64	108.89	128.43	90.52
18-Jun-94	92.14	92.33	91.81	108.63	72.64
25-Jun-94	99.47	100.86	96.68	113.49	83.47
02-Jul-94	109.64	111.80	105.72	122.66	94.60
09-Jul-94	85.43	86.85	83.02	99.23	70.38
16-Jul-94	83.39	88.40	74.49	97.92	66.76
23-Jul-94	80.05	85.21	71.33	98.17	58.53
30-Jul-94	99.15	101.84	95.01	123.61	69.95
06-Aug-94	71.37	73.12	68.54	94.61	44.35
13-Aug-94	89.67	97.10	71.37	117.43	58.49
20-Aug-94	85.38	92.69	73.40	106.86	60.46
27-Aug-94	111.57	115.84	104.12	132.75	86.60
03-Sep-94	86.89	87.11	86.55	106.23	63.72
10-Sep-94	75.82	77.30	73.61	94.63	52.74
17-Sep-94	76.17	77.22	74.57	94.77	53.16
24-Sep-94	87.20	88.24	85.62	105.11	65.99
01-Oct-94	75.99	74.36	78.49	95.31	52.48
08-Oct-94	83.73	84.62	82.17	104.16	60.92
15-Oct-94	78.72	77.91	79.98	101.00	52.03
22-Oct-94	72.89	80.76	60.39	93.47	49.65
29-Oct-94	56.15	52.86	60.84	74.97	34.04
05-Nov-94	41.82	38.93	45.24	62.79	16.47

APPENDIX A (Continued)

Calculated Gross Margins for Beef ($/Head)

12-Nov-94	51.66	50.89	52.90	74.17	26.90
19-Nov-94	78.03	77.50	78.74	101.23	49.40
26-Nov-94	65.91	65.02	67.60	91.06	36.24
03-Dec-94	73.15	72.92	73.55	99.50	43.46
10-Dec-94	57.14	53.82	62.51	83.60	28.04
17-Dec-94	52.73	48.82	58.54	77.75	25.87
24-Dec-94	75.71	72.07	83.22	103.30	47.10
31-Dec-94	69.54	69.35	69.75	96.43	37.84

APPENDIX B

Calculated Gross Margins for Pork ($/Head).

	Iowa-Southern Minnesota				6 market
	#1	#2	#3	#4	#1
01/02/88	9.91	6.72	3.52	0.34	10.27
01/09/88	10.86	7.74	4.61	1.50	10.49
01/16/88	14.07	10.72	7.40	4.07	13.87
01/23/88	10.03	6.71	3.40	0.10	9.20
01/30/88	7.62	4.49	1.34	-1.79	7.33
02/06/88	5.12	1.92	-1.28	-4.48	4.84
02/13/88	5.96	2.52	-0.92	-4.36	5.40
02/20/88	7.67	4.30	0.95	-2.41	7.30
02/27/88	5.62	2.42	-0.78	-3.98	5.78
03/05/88	8.56	5.43	2.30	-0.85	8.23
03/12/88	10.56	7.44	4.33	1.23	10.54
03/19/88	8.09	5.05	2.02	-1.02	8.73
03/26/88	9.90	6.82	3.74	0.66	9.22
04/02/88	7.82	4.74	1.66	-1.42	8.51
04/09/88	7.44	4.38	1.32	-1.75	8.66
04/16/88	7.19	4.13	1.09	-1.96	7.55
04/23/88	7.94	4.86	1.76	-1.32	9.11
04/30/88	10.89	7.67	4.45	1.21	11.49
05/07/88	8.68	5.36	2.05	-1.26	8.45
05/14/88	8.44	4.88	1.31	-2.24	7.28
05/21/88	5.55	1.88	-1.79	-5.44	5.23
05/28/88	2.54	-0.94	-4.43	-7.91	3.29
06/04/88	5.07	1.54	-1.99	-5.52	5.67
06/11/88	4.13	0.70	-2.72	-6.15	4.42
06/18/88	6.99	3.43	-0.13	-3.69	6.90
06/25/88	9.37	5.88	2.38	-1.11	8.80
07/02/88	9.02	5.59	2.15	-1.30	11.00
07/09/88	12.02	8.52	5.01	1.51	11.74
07/16/88	7.28	4.01	0.75	-2.50	7.89
07/23/88	6.57	3.37	0.19	-2.98	6.33
07/30/88	5.52	2.27	-0.96	-4.20	3.85
08/06/88	8.80	5.41	2.03	-1.37	8.48
08/13/88	9.50	6.03	2.55	-1.06	8.51
08/20/88	7.47	4.04	0.61	-2.83	6.75
08/27/88	6.00	2.68	-0.66	-4.01	-1.92
09/03/88	8.87	5.46	2.04	-1.37	10.12
09/10/88	15.35	11.82	8.29	4.76	15.80
09/17/88	15.93	12.48	9.03	5.59	15.79

APPENDIX B (Continued)

Calculated Gross Margins for Pork ($/Head).

09/24/88	16.33	13.03	9.71	6.39	16.58
10/01/88	11.68	8.55	5.42	2.27	11.75
10/08/88	12.91	9.71	6.51	3.31	13.17
10/15/88	13.21	9.97	6.74	3.48	12.44
10/22/88	14.53	11.33	8.11	4.91	14.11
10/29/88	17.10	13.93	10.76	7.60	15.99
11/05/88	14.08	10.93	7.78	4.61	14.36
11/12/88	12.10	9.11	6.10	3.09	11.95
11/19/88	14.71	11.56	8.43	5.28	14.30
11/26/88	14.53	11.40	8.27	5.13	14.09
12/03/88	15.06	11.91	8.76	5.59	14.92
12/10/88	13.23	10.04	6.86	3.67	12.11
12/17/88	10.64	7.26	3.89	0.51	10.41
12/24/88	8.56	5.11	1.67	-1.77	8.53
12/31/88	7.04	3.58	0.11	-3.36	6.26
01/07/89	7.70	4.40	1.11	-2.20	7.12
01/14/89	6.21	2.99	-0.23	-3.45	5.54
01/21/89	7.98	4.78	1.56	-1.64	7.28
01/28/89	8.31	5.19	2.08	-1.04	6.84
02/04/89	12.40	9.15	5.91	2.66	7.04
02/11/89	12.54	9.14	5.74	2.35	12.10
02/18/89	11.72	8.36	4.99	1.64	10.63
02/25/89	10.56	7.24	3.92	0.60	9.61
03/04/89	9.34	6.13	2.91	-0.29	7.65
03/11/89	12.47	9.11	5.75	2.42	11.36
03/18/89	12.31	8.97	5.63	2.31	11.49
03/25/89	11.64	8.42	5.22	2.02	9.98
04/01/89	13.03	9.88	6.71	3.56	11.84
04/08/89	13.36	10.20	7.03	3.84	12.82
04/15/89	14.23	11.01	7.77	4.55	13.93
04/22/89	13.77	10.48	7.19	3.90	12.66
04/29/89	12.65	9.36	6.07	2.76	11.90
05/06/89	11.18	7.87	4.56	1.26	10.77
05/13/89	7.51	4.09	0.64	-2.79	6.99
05/20/89	8.14	4.61	1.06	-2.49	6.44
05/27/89	7.20	3.55	-0.12	-3.79	4.97
06/03/89	7.69	4.01	0.32	-3.36	5.90
06/10/89	6.70	3.05	-0.62	-4.27	5.08
06/17/89	8.73	5.08	1.41	-2.24	8.02
06/24/89	9.30	5.57	1.84	-1.88	6.33
07/01/89	7.69	3.89	0.06	-3.75	6.16

APPENDIX B (Continued)

Calculated Gross Margins for Pork ($/Head).

07/08/89	10.64	6.83	3.00	-0.81	8.15
07/15/89	9.47	5.64	1.82	-2.01	8.21
07/22/89	6.55	2.91	-0.75	-4.41	4.83
07/29/89	8.61	4.86	1.09	-2.68	7.26
08/05/89	13.86	9.85	5.84	1.83	12.40
08/12/89	10.74	7.10	2.86	-1.08	9.81
08/19/89	10.23	6.27	2.31	-1.65	9.98
08/26/89	8.69	4.82	0.94	-2.93	8.38
09/02/89	11.34	7.64	3.91	0.21	12.56
09/09/89	15.75	12.09	8.42	4.77	14.22
09/16/89	16.59	12.97	9.32	5.72	14.79
09/23/89	13.88	10.26	6.62	3.00	11.48
09/30/89	12.18	8.43	4.69	0.94	9.90
10/07/89	11.98	8.10	4.20	0.31	10.13
10/14/89	12.37	8.24	4.09	-0.05	11.46
10/21/89	13.66	9.61	5.57	1.54	11.96
10/28/89	12.71	8.69	4.68	0.67	10.75
11/04/89	14.34	10.58	6.82	3.05	12.44
11/11/89	12.77	9.27	5.76	2.26	10.79
11/18/89	12.27	8.72	5.19	1.62	11.00
11/25/89	12.54	8.88	5.15	1.44	11.39
12/02/89	11.12	7.31	3.49	-0.34	9.13
12/09/89	8.69	4.77	0.86	-3.06	6.93
12/16/89	7.16	3.08	-0.98	-5.06	4.53
12/23/89	7.52	3.43	-0.69	-4.80	5.72
12/30/89	15.44	11.17	6.89	2.63	18.84
01/06/90	7.23	3.56	-0.13	-3.80	5.07
01/13/90	9.26	5.66	2.03	-1.57	8.06
01/20/90	5.09	1.68	-1.73	-5.14	4.07
01/27/90	6.64	3.18	-0.32	-3.80	5.47
02/03/90	5.90	2.27	-1.35	-4.99	5.49
02/10/90	9.62	5.90	2.17	-1.54	7.98
02/17/90	11.57	7.67	3.76	-0.14	8.63
02/24/90	8.26	4.47	0.66	-3.13	5.74
03/03/90	8.72	4.79	0.86	-3.06	6.50
03/10/90	9.81	5.72	1.63	-2.46	8.53
03/17/90	10.74	6.45	2.13	-2.19	9.14
03/24/90	10.00	5.77	1.53	-2.71	8.39
03/31/90	7.67	3.62	-0.44	-4.50	6.25
04/07/90	8.31	4.22	0.12	-3.97	7.24
04/14/90	9.80	5.63	1.44	-2.75	9.08

APPENDIX B (Continued)

Calculated Gross Margins for Pork ($/Head).

04/21/90	9.33	5.07	0.83	-3.40	9.15
04/28/90	4.80	0.58	-3.65	-7.87	3.90
05/05/90	4.70	0.37	-3.96	-8.27	4.23
05/12/90	3.41	-1.14	-5.72	-10.28	3.10
05/19/90	4.05	-0.66	-5.40	-10.13	1.42
05/26/90	4.38	-0.54	-5.46	-10.36	4.67
06/02/90	4.79	-0.07	-4.92	-9.78	3.85
06/09/90	6.33	1.66	-3.03	-7.70	5.34
06/16/90	6.98	2.57	-1.86	-6.28	6.19
06/23/90	10.06	5.73	1.40	-2.93	8.72
06/30/90	5.19	0.68	-3.84	-8.35	4.13
07/07/90	9.02	4.20	-0.65	-5.48	8.50
07/14/90	10.26	5.33	0.39	-4.52	8.97
07/21/90	8.74	3.58	-1.57	-6.73	7.44
07/28/90	6.98	2.15	-2.71	-7.55	6.24
08/04/90	11.99	7.22	2.44	-2.32	11.45
08/11/90	12.01	7.48	2.94	-1.60	11.57
08/18/90	12.16	7.61	3.06	-1.50	11.99
08/25/90	12.95	8.50	4.04	-0.41	12.57
09/01/90	14.48	9.80	5.41	0.89	13.31
09/08/90	19.35	14.66	9.95	5.26	20.09
09/15/90	14.33	9.83	5.31	0.81	14.78
09/22/90	12.63	8.12	3.59	-0.93	12.58
09/29/90	10.96	6.46	1.96	-2.53	9.99
10/06/90	14.16	9.66	5.16	0.66	14.47
10/13/90	9.70	5.09	0.46	-4.13	10.15
10/20/90	11.31	6.68	2.04	-2.60	11.32
10/27/90	9.77	5.17	0.56	-4.03	9.29
11/03/90	14.88	10.42	5.94	1.50	14.36
11/10/90	18.06	13.85	9.64	5.44	17.79
11/17/90	20.61	16.36	12.12	7.87	21.13
11/24/90	18.17	14.11	10.04	5.96	19.00
12/01/90	20.87	16.72	12.55	8.39	22.22
12/08/90	22.41	18.21	14.00	9.79	23.72
12/15/90	20.99	16.95	12.90	8.86	20.85
12/22/90	11.17	7.38	3.58	-0.22	11.91
12/29/90	13.47	9.67	5.86	2.06	13.93
01/05/91	10.36	6.82	3.26	-0.28	10.45
01/12/91	12.05	8.36	4.64	0.96	12.81
01/19/91	11.59	7.83	4.08	0.28	12.26
01/26/91	6.69	2.88	-0.92	-4.71	6.71

APPENDIX B (Continued)

Calculated Gross Margins for Pork ($/Head).

02/02/91	6.37	2.54	-1.28	-5.10	6.66
02/09/91	9.46	5.47	1.45	-2.54	9.69
02/16/91	8.48	4.50	0.52	-3.47	8.88
02/23/91	7.80	3.84	-0.13	-4.09	9.13
03/02/91	9.22	5.36	1.51	-2.37	9.11
03/09/91	9.03	5.14	1.25	-2.64	10.30
03/16/91	8.73	4.75	0.77	-3.21	10.37
03/23/91	4.51	0.72	-3.08	-6.87	5.27
03/30/91	7.54	3.82	3.47	-0.67	7.46
04/06/91	7.68	4.01	0.32	-3.36	7.30
04/13/91	6.61	2.91	-0.81	-4.52	6.54
04/20/91	7.17	3.40	-0.39	-4.17	7.94
04/27/91	5.50	1.68	-2.15	-6.00	6.26
05/04/91	4.33	0.44	-3.46	-7.34	4.92
05/11/91	4.36	0.27	-3.84	-7.93	4.98
05/18/91	9.33	4.82	0.29	-4.24	10.19
05/25/91	3.68	-0.51	-4.72	-8.91	4.23
06/01/91	7.03	2.84	-1.35	-5.54	8.39
06/08/91	7.52	3.40	-0.73	-4.87	10.35
06/15/91	8.69	4.35	0.01	-4.30	10.35
06/22/91	7.54	3.20	-1.16	-5.50	7.48
06/29/91	6.26	1.93	-2.41	-6.74	6.08
07/06/91	9.20	4.94	0.67	-3.58	8.83
07/13/91	5.26	0.93	-3.41	-8.60	5.79
07/20/91	5.24	0.85	-3.54	-7.92	5.58
07/27/91	8.34	3.99	-0.38	-4.73	8.18
08/03/91	7.09	2.80	-1.50	-5.78	6.54
08/10/91	7.28	3.10	-1.11	-5.29	8.85
08/17/91	12.66	8.51	4.36	0.22	12.28
08/24/91	10.20	6.08	1.94	-2.17	9.79
08/31/91	10.15	6.27	2.40	-1.48	11.74
09/07/91	11.41	7.69	3.95	0.21	11.52
09/14/91	13.25	9.38	5.50	1.61	13.61
09/21/91	11.90	8.00	4.12	0.23	12.21
09/28/91	11.21	7.21	3.22	-0.78	11.93
10/05/91	11.93	7.87	3.81	-0.25	13.04
10/12/91	13.70	9.58	5.44	1.31	13.84
10/19/91	14.67	10.73	6.76	2.80	15.39
10/26/91	18.97	15.13	11.29	7.44	19.65
11/02/91	22.75	19.05	15.33	11.63	22.59
11/09/91	22.30	18.65	15.00	11.36	23.63

APPENDIX B (Continued)

Calculated Gross Margins for Pork ($/Head).

11/16/91	19.00	15.38	11.75	8.13	20.35
11/23/91	16.74	13.22	9.67	6.15	17.84
11/30/91	18.22	14.52	10.82	7.12	20.01
12/07/91	19.80	15.88	11.96	8.04	21.02
12/14/91	15.49	11.77	8.04	4.32	16.85
12/21/91	11.70	8.28	4.85	1.43	12.13
12/28/91	10.54	7.23	3.91	0.60	11.24
01/04/92	11.79	8.56	5.33	2.10	13.02
01/11/92	11.42	8.21	5.01	1.81	12.64
01/18/92	13.61	10.23	6.84	3.46	14.48
01/25/92	12.40	9.00	5.60	2.20	13.55
02/01/92	10.52	7.18	3.81	0.47	12.18
02/08/92	9.56	6.21	2.87	-0.48	11.60
02/15/92	9.31	5.82	2.32	-1.18	9.69
02/22/92	10.09	6.44	2.80	-0.84	11.32
02/29/92	13.15	9.54	5.94	2.33	13.64
03/07/92	10.99	7.89	4.49	1.09	12.20
03/14/92	12.02	8.55	5.07	1.60	13.45
03/21/92	12.98	9.48	5.97	2.47	14.42
03/28/92	11.41	7.94	4.48	1.03	12.73
04/04/92	11.00	7.55	4.08	0.62	11.93
04/11/92	9.94	6.34	2.75	-0.84	10.07
04/18/92	8.65	5.02	1.37	-2.24	8.92
04/25/92	9.54	5.83	2.13	-1.57	11.39
05/02/92	7.36	4.16	0.35	-3.46	9.01
05/09/92	8.40	4.54	0.68	-3.16	8.34
05/16/92	12.37	8.43	4.48	0.57	12.40
05/23/92	9.12	5.23	1.35	-2.52	10.63
05/30/92	8.37	4.47	0.57	-3.31	9.65
06/06/92	8.50	4.66	0.84	-3.01	8.30
06/13/92	7.53	3.66	-0.22	-4.07	8.63
06/20/92	8.45	4.37	0.29	-3.77	9.03
06/27/92	7.24	3.14	-0.96	-5.06	8.13
07/04/92	7.38	3.41	-0.54	-4.49	6.84
07/11/92	13.05	9.01	4.98	0.94	13.38
07/18/92	13.86	10.10	6.36	2.60	13.23
07/25/92	12.55	8.87	5.18	1.49	12.70
08/01/92	11.76	8.20	4.61	1.05	11.05
08/08/92	11.65	8.02	4.38	0.74	12.83
08/15/92	13.51	9.73	7.94	4.13	12.81
08/22/92	11.94	8.17	4.37	0.60	12.14

APPENDIX B (Continued)

Calculated Gross Margins for Pork ($/Head).

08/29/92	9.88	6.12	2.40	-1.34	11.38
09/05/92	12.31	8.64	4.96	1.29	13.29
09/12/92	13.39	9.65	5.90	2.16	14.84
09/19/92	15.55	11.81	8.08	4.33	15.91
09/26/92	13.25	9.66	6.04	2.43	14.30
10/03/92	12.55	8.92	5.30	1.68	13.09
10/10/92	12.99	9.31	5.78	1.93	12.80
10/17/92	13.55	9.84	6.10	2.39	14.34
10/24/92	13.06	9.45	5.82	2.21	13.22
10/31/92	15.55	11.83	8.11	4.39	16.27
11/07/92	15.44	11.88	8.32	4.74	15.72
11/14/92	14.34	10.71	7.07	3.55	14.15
11/21/92	11.16	7.62	4.07	0.53	11.11
11/28/92	11.98	8.38	4.77	1.18	12.13
12/05/92	13.66	9.93	6.19	2.46	14.39
12/12/92	13.11	9.29	5.48	1.67	13.85
12/19/92	11.01	7.38	3.77	0.14	11.50
12/26/92	11.30	7.83	4.36	0.88	10.95
01/02/93	13.24	9.72	6.17	2.65	13.76
01/09/93	12.12	8.70	5.26	1.84	13.49
01/16/93	13.48	9.88	6.28	2.70	13.08
01/23/93	10.03	6.59	3.16	-0.28	9.69
01/30/93	9.35	5.94	2.54	-0.86	9.94
02/06/93	7.87	4.41	0.96	-2.47	7.96
02/13/93	8.59	5.05	1.53	-2.00	9.15
02/20/93	8.03	4.42	0.79	-2.83	7.65
02/27/93	9.73	5.96	2.17	-1.60	10.07
03/06/93	9.01	5.31	1.60	-2.08	8.75
03/13/93	8.58	4.89	1.21	-2.46	9.24
03/20/93	8.48	4.76	1.02	-2.70	8.72
03/27/93	7.94	4.14	0.37	-3.41	8.28
04/03/93	9.18	5.48	1.76	-1.95	9.97
04/10/93	11.21	7.60	3.96	0.35	11.53
04/17/93	13.69	9.98	6.28	2.57	14.22
04/24/93	11.80	8.24	4.68	1.11	12.69
05/01/93	9.91	6.30	2.68	-0.94	10.22
05/08/93	9.65	5.98	2.27	-1.40	10.38
05/15/93	8.78	5.11	1.43	-1.87	8.09
05/22/93	6.45	2.74	-0.95	-4.64	6.43
05/29/93	7.07	3.35	-0.38	-4.10	6.40
06/05/93	9.04	5.18	1.30	-2.58	8.96

APPENDIX B (Continued)

Calculated Gross Margins for Pork ($/Head).

06/12/93	9.07	5.01	0.95	-3.10	10.01
06/19/93	9.40	5.28	1.15	-2.97	9.22
06/26/93	11.52	7.36	3.21	-0.92	11.43
07/03/93	8.46	4.53	0.58	-3.34	8.75
07/10/93	10.60	6.76	2.91	-0.93	8.78
07/17/93	9.02	5.38	1.73	-1.91	10.01
07/24/93	11.24	7.70	4.14	0.60	11.82
07/31/93	11.43	7.93	4.40	0.90	13.16
08/07/93	11.66	8.09	4.51	0.95	12.02
08/14/93	9.97	6.31	2.62	-1.04	10.18
08/21/93	11.86	8.01	4.12	0.24	12.02
08/28/93	10.51	6.51	2.53	-1.46	11.33
09/04/93	10.35	6.43	2.51	-1.43	11.87
09/11/93	11.20	7.59	3.25	-0.73	13.18
09/18/93	11.49	7.49	3.48	-0.52	12.70
09/25/93	9.69	5.76	1.81	-2.12	11.56
10/02/93	11.45	7.50	3.57	-0.37	12.84
10/09/93	10.48	6.58	2.66	-1.24	10.70
10/16/93	11.63	7.71	3.81	-0.09	12.14
10/23/93	12.15	8.37	4.59	0.81	13.81
10/30/93	12.10	8.39	4.68	0.99	12.90
11/06/93	14.13	10.40	6.65	2.91	15.07
11/13/93	14.56	10.94	7.30	3.66	15.12
11/20/93	16.76	13.27	9.77	6.28	17.39
11/27/93	14.62	11.22	7.82	4.43	15.46
12/04/93	15.48	11.99	8.50	4.98	16.34
12/11/93	15.84	12.36	8.91	5.43	16.33
12/18/93	9.59	6.45	3.30	0.17	10.73
12/25/93	12.45	9.34	6.20	3.09	13.51
01/01/94	11.76	8.66	5.55	2.45	11.31
01/08/94	9.40	6.36	3.32	0.28	9.01
01/15/94	11.47	8.26	5.06	1.85	9.55
01/22/94	12.34	8.72	5.11	1.49	12.03
01/29/94	8.65	5.12	1.58	-1.95	8.65
02/05/94	7.73	4.06	0.37	-3.30	8.21
02/12/94	8.49	4.70	0.90	-2.89	9.28
02/19/94	10.55	6.89	3.24	-0.42	9.79
02/26/94	11.18	7.58	3.96	0.36	10.24
03/05/94	10.24	6.76	3.27	-0.20	10.14
03/12/94	10.89	7.38	3.86	0.33	11.51
03/19/94	11.48	8.04	4.60	1.18	9.86

APPENDIX B (Continued)

Calculated Gross Margins for Pork ($/Head).

03/26/94	10.51	7.29	4.07	0.85	10.62
04/02/94	12.18	8.92	5.68	2.42	11.72
04/09/94	13.17	9.82	6.47	3.12	13.38
04/16/94	13.70	10.37	7.03	3.70	13.13
04/23/94	13.64	10.22	6.80	3.36	12.75
04/30/94	13.03	9.66	6.29	2.93	11.66
05/07/94	11.17	7.85	4.54	1.23	11.88
05/14/94	9.91	6.56	3.19	-0.18	8.32
05/21/94	11.05	7.65	4.23	0.81	10.59
05/28/94	10.28	6.93	2.07	-1.22	9.15
06/04/94	10.81	7.48	4.15	0.82	10.68
06/11/94	10.84	7.53	4.22	0.89	10.27
06/18/94	8.80	5.52	2.24	-1.03	7.44
06/25/94	7.29	4.06	0.82	-2.40	5.84
07/02/94	6.13	2.87	-0.39	-3.64	5.84
07/09/94	10.11	6.80	3.47	0.16	9.14
07/16/94	8.90	5.63	2.36	-0.92	8.80
07/23/94	6.20	3.04	-0.13	-3.30	6.24
07/30/94	8.99	5.57	2.12	-1.30	10.43
08/06/94	10.60	7.17	3.73	0.28	11.83
08/13/94	12.66	9.25	5.81	2.40	13.51
08/20/94	11.15	7.80	4.44	1.09	11.71
08/27/94	14.75	11.51	8.27	5.03	15.48
09/03/94	17.79	14.64	11.49	8.34	19.65
09/10/94	21.82	18.60	15.38	12.17	22.17
09/17/94	22.43	19.15	15.88	12.60	22.94
09/24/94	23.64	20.46	17.29	14.10	24.09
10/01/94	20.91	17.98	15.06	12.15	21.12
10/08/94	21.70	18.90	16.07	13.25	22.12
10/15/94	22.97	19.96	16.96	13.95	22.73
10/22/94	29.59	26.48	23.37	20.25	30.40
10/29/94	28.24	25.24	22.24	19.23	28.77
11/05/94	27.24	24.40	21.57	18.71	27.38
11/12/94	28.02	25.31	22.62	19.95	28.36
11/19/94	32.56	29.71	26.87	24.02	32.82
11/26/94	38.47	35.39	32.32	29.25	38.72
12/03/94	39.49	36.30	33.12	29.95	39.43
12/10/94	32.84	29.80	26.74	23.70	33.37
12/17/94	21.81	18.95	16.06	13.21	21.71
12/24/94	20.09	17.15	14.20	11.27	20.79
12/31/94	22.33	19.34	16.36	13.37	22.11

APPENDIX C

Calculated Gross Margins for Lamb ($/Head).

	Carcass Value Margins		Cutout Value
	55-65#	65-75#	
01/05/90	11.70	4.90	
01/12/90	11.19	2.48	
01/19/90	10.38	3.78	
01/26/90	13.63	10.28	
02/02/90	16.18	12.83	
02/09/90	12.56	9.26	
02/16/90	13.90	10.50	
02/23/90	10.36	7.01	
03/02/90	10.29	6.94	
03/09/90	13.58	10.28	
03/16/90	11.94	8.69	
03/23/90	13.32	9.97	
03/30/90	9.63	6.33	
04/06/90	-3.94	-10.14	
04/13/90	-0.10	-6.50	
04/20/90	11.44	4.74	
04/27/90	14.90	8.30	
05/04/90	13.46	10.11	
05/11/90	12.23	8.93	
05/18/90	7.46	4.21	
05/25/90	11.83	8.63	
06/01/90	12.63	9.28	
06/08/90	11.33	8.13	
06/15/90	10.73	10.73	
06/22/90	8.74	8.74	
06/29/90	14.12	14.12	
07/06/90	15.97	15.97	
07/13/90	14.60	14.60	
07/20/90	12.26	12.26	
07/27/90	10.24	12.07	
08/03/90	12.94	16.04	
08/10/90	12.96	16.06	
08/17/90	14.72	15.96	
08/24/90	14.69	15.95	
08/31/90	15.88	17.12	
09/07/90	14.69	15.95	
09/14/90	14.85	16.11	
09/21/90	15.13	16.37	

APPENDIX C (Continued)

Calculated Gross Margins for Lamb ($/Head).

09/28/90	14.56	16.45
10/05/90	13.69	14.95
10/12/90	13.05	13.05
10/19/90	14.17	12.89
10/26/90	13.95	10.75
11/02/90	16.55	13.35
11/09/90	16.97	13.82
11/16/90	17.25	14.05
11/23/90	17.69	14.44
11/30/90	14.90	11.70
12/07/90	17.10	13.85
12/14/90	12.46	9.21
12/21/90	9.30	6.05
12/28/90	15.94	12.69
01/04/91	15.17	11.87
01/11/91	13.65	10.40
01/18/91	13.22	9.97
01/25/91	12.52	9.32
02/01/91	11.68	8.43
02/08/91	14.81	11.51
02/15/91	14.73	11.43
02/22/91	13.09	9.84
03/01/91	18.16	14.91
03/08/91	16.60	13.30
03/15/91	16.80	13.50
03/22/91	11.69	8.54
03/29/91	12.82	9.72
04/05/91	14.06	10.86
04/12/91	15.17	11.87
04/19/91	10.48	7.18
04/26/91	10.80	7.50
05/03/91	7.98	4.68
05/10/91	10.65	7.35
05/17/91	8.17	6.22
05/24/91	11.44	9.46
05/31/91	12.13	10.83
06/07/91	12.48	12.48
06/14/91	11.19	13.08
06/21/91	9.63	11.58
06/28/91	11.37	13.26
07/05/91	10.49	12.35

APPENDIX C (Continued)

Calculated Gross Margins for Lamb ($/Head).

07/12/91	11.07	12.96
07/19/91	11.09	12.98
07/26/91	9.74	11.57
08/02/91	13.52	15.35
08/09/91	13.84	15.67
08/16/91	13.43	15.26
08/23/91	14.88	16.71
08/30/91	15.26	17.09
09/06/91	15.00	16.83
09/13/91	13.68	15.51
09/20/91	14.66	17.71
09/27/91	13.77	16.77
10/04/91	12.45	15.50
10/11/91	13.54	16.64
10/18/91	11.78	14.88
10/25/91	12.10	15.25
11/01/91	13.68	12.73
11/08/91	13.10	12.17
11/15/91	12.99	12.99
11/22/91	13.42	13.42
11/29/91	14.15	14.15
12/06/91	11.93	11.93
12/13/91	12.97	12.97
12/20/91	11.40	11.40
12/27/91	11.96	11.96
01/03/92	11.18	11.17
01/10/92	11.76	10.44
01/17/92	10.97	9.67
01/24/92	10.94	9.62
01/31/92	9.93	8.61
02/07/92	13.05	11.71
02/14/92	12.41	9.26
02/21/92	11.88	8.53
02/28/92	11.05	7.75
03/06/92	11.16	8.52
03/13/92	12.30	10.29
03/20/92	7.68	5.04
03/27/92	9.78	8.11
04/03/92	8.40	6.75
04/10/92	9.21	7.61
04/17/92	7.58	6.00

APPENDIX C (Continued)

Calculated Gross Margins for Lamb ($/Head).

04/24/92	7.15	5.93	
05/01/92	8.36	7.04	15.37
05/08/92	10.59	9.29	15.85
05/15/92	11.93	10.31	16.52
05/22/92	12.03	10.75	14.86
05/29/92	12.66	11.36	17.21
06/05/92	11.70	10.42	15.80
06/12/92	12.74	11.46	12.14
06/19/92	12.61	12.61	15.69
06/26/92	11.09	13.01	16.56
07/03/92	12.81	14.70	17.07
07/10/92	11.87	13.79	15.63
07/17/92	12.77	14.32	20.49
07/24/92	14.74	16.91	24.43
07/31/92	13.59	15.42	23.57
08/07/92	15.66	17.49	25.37
08/14/92	15.97	17.80	23.74
08/21/92	15.04	17.48	22.26
08/28/92	15.11	18.16	15.60
09/04/92	14.21	17.21	15.89
09/11/92	14.33	17.38	15.96
09/18/92	14.87	17.97	18.72
09/25/92	15.62	18.72	19.96
10/02/92	14.55	17.39	21.21
10/09/92	12.84	14.41	18.99
10/16/92	13.62	13.62	20.40
10/23/92	14.25	14.25	18.04
10/30/92	14.00	14.00	18.79
11/06/92	14.75	14.75	16.76
11/13/92	17.33	17.33	19.44
11/20/92	13.40	13.40	17.46
11/27/92	17.45	16.17	20.55
12/04/92	9.79	8.51	15.95
12/11/92	8.87	8.87	15.41
12/18/92	24.83	24.83	31.85
12/25/92	6.24	6.24	13.76
01/01/93	8.73	8.73	21.27
01/08/93	9.32	9.32	20.91
01/15/93	10.39	10.39	19.90
01/22/93	10.18	10.18	18.69
01/29/93	9.76	9.76	20.60

APPENDIX C (Continued)

Calculated Gross Margins for Lamb ($/Head).

02/05/93	11.08	11.08	22.49
02/12/93	11.23	11.23	25.84
02/19/93	12.25	12.25	22.72
02/26/93	12.21	12.21	26.41
03/05/93	14.10	14.10	20.40
03/12/93	14.45	14.45	28.29
03/19/93	12.48	12.48	24.39
03/26/93	16.70	14.72	27.92
04/02/93	18.86	16.94	27.63
04/09/93	13.67	10.52	26.90
04/16/93	14.71	11.51	30.74
04/23/93	20.61	17.26	33.27
04/30/93	20.70	17.40	29.08
05/07/93	24.73	21.33	30.10
05/14/93	21.64	18.29	27.27
05/21/93	18.33	13.38	24.42
05/28/93	23.65	16.95	27.00
06/04/93	23.93	17.13	27.75
06/11/93	22.39	15.59	27.80
06/18/93	18.83	12.33	22.57
06/25/93	21.99	15.39	25.21
07/02/93	17.90	13.03	20.76
07/09/93	14.89	14.89	20.17
07/16/93	16.75	15.13	21.46
07/23/93	16.39	16.39	21.79
07/30/93	15.44	15.44	22.51
08/06/93	16.95	16.95	21.91
08/13/93	14.83	14.83	18.71
08/20/93	11.72	11.72	17.05
08/27/93	12.97	12.97	22.17
09/03/93	11.67	11.67	20.90
09/10/93	10.57	10.57	20.99
09/17/93	11.25	11.25	21.84
09/24/93	12.94	12.94	22.79
10/01/93	13.07	13.07	22.38
10/08/93	12.89	12.89	22.20
10/15/93	12.23	12.23	20.36
10/22/93	11.66	11.66	19.94
10/29/93	11.45	11.45	20.45
11/05/93	12.75	12.75	19.48
11/12/93	12.63	12.63	20.18

APPENDIX C (Continued)

Calculated Gross Margins for Lamb ($/Head).

11/19/93	14.19	14.19	24.46
11/26/93	12.44	12.44	28.81
12/03/93	11.74	11.74	30.07
12/10/93	13.08	13.08	30.64
12/17/93	15.68	13.76	30.19
12/24/93	13.60	11.65	28.80
12/31/93	13.01	11.06	27.80
01/07/94	12.66	10.38	28.88
01/14/94	14.33	8.66	28.06
01/21/94	17.01	13.17	29.26
01/28/94	17.99	13.83	27.48
02/04/94	17.58	14.00	27.67
02/11/94	17.17	14.57	26.82
02/18/94	17.41	14.81	27.29
02/25/94	17.89	15.29	26.71
03/04/94	18.06	14.71	28.53
03/11/94	18.88	15.53	30.09
03/18/94	21.50	18.15	32.84
03/25/94	22.91	19.66	33.18
04/01/94	21.67	15.82	33.20
04/08/94	21.24	14.54	32.36
04/15/94	21.71	15.11	30.19
04/22/94	23.22	16.72	29.70
04/29/94	22.03	15.63	29.76
05/06/94	21.32	14.72	24.06
05/13/94	20.68	13.98	21.38
05/20/94	19.63	13.03	21.51
05/27/94	19.15	15.85	20.76
06/03/94	18.25	15.00	20.85
06/10/94	18.34	15.14	20.26
06/17/94	15.03	15.03	25.93
06/24/94	14.93	14.93	23.69
07/01/94	14.01	14.01	24.63
07/08/94	14.59	14.59	32.72
07/15/94	13.01	13.01	35.60
07/22/94	13.35	13.35	37.23
07/29/94	12.72	12.72	33.60
08/05/94	13.72	13.72	35.73
08/12/94	18.56	18.56	40.61
08/19/94	16.09	16.09	35.77
08/26/94	15.38	15.38	31.24

APPENDIX C (Continued)

Calculated Gross Margins for Lamb ($/Head).

09/02/94	16.55	16.55	29.49
09/09/94	18.03	18.03	31.17
09/16/94	15.47	18.42	29.50
09/23/94	13.90	16.95	26.71
09/30/94	12.85	15.85	25.32
10/07/94	12.65	15.65	25.52
10/14/94	12.60	15.60	23.85
10/21/94	13.74	16.74	24.40
10/28/94	13.75	16.80	23.63
11/04/94	12.74	15.74	22.28
11/11/94	14.07	17.12	23.55
11/18/94	14.27	14.27	24.58
11/25/94	14.17	14.17	26.35
12/02/94	13.37	12.15	27.31
12/09/94	14.78	13.52	29.76
12/16/94	15.71	14.47	30.45
12/23/94	18.00	16.74	34.93
12/30/94	17.48	16.18	33.62

VITA

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Master of Science

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