



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

STAFF PAPER SERIES

**FILLING THE LIVESTOCK FEED TROUGHS OF
MINNESOTA AND BEYOND**

by
Douglas G. Tiffany and Jerry Fruin

DEPARTMENT OF APPLIED ECONOMICS

COLLEGE OF AGRICULTURAL, FOOD, AND ENVIRONMENTAL SCIENCES

UNIVERSITY OF MINNESOTA

FILLING THE LIVESTOCK FEED TROUGHS OF
MINNESOTA AND BEYOND

by
Douglas G. Tiffany and Jerry Fruin

Funding for this research was provided by the Minnesota Department of Transportation and the Agricultural Experiment Station.

The analyses and views reported in this paper are those of the author(s). They are not necessarily endorsed by the Department of Applied Economics, by the University of Minnesota, or by the Minnesota Department of Transportation.

The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

Copies of this publication are available at <http://agecon.lib.umn.edu/>. Information on other titles in this series may be obtained from: Waite Library, University of Minnesota, Department of Applied Economics, 232 Classroom Office Building, 1994 Buford Avenue, St. Paul, MN 55108, U.S.A.

This report was also published as Minnesota Department of Transportation Research Report 2002-13.



Research

Filling the Feed Troughs
of Minnesota and Beyond

Filling the Livestock Feed Troughs of Minnesota and Beyond

Final Report

Prepared by

Douglas G. Tiffany, M.S.

Department of Applied Economics
University of Minnesota

Jerry Fruin, Ph. D.

Department of Applied Economics
University of Minnesota

September 2001

Published by

Minnesota Department of Transportation
Office of Research Services
First Floor
395 John Ireland Boulevard, MS 330
St. Paul, MN 55155

This report represents the results of research conducted by the authors and does not necessarily represent the views or policy of the Minnesota Department of Transportation. This report does not contain a standard or specified technique.

ACKNOWLEDGMENTS

The authors express appreciation to The Minnesota Department of Transportation (Mn/DOT), and to the University of Minnesota's Agricultural Experiment Station. Special thanks are extended to members of the project's Technical Advisory Panel (TAP) and Technical Liaisons for the time, support, and insights they brought to this research. TAP members included:

1. Bob Zelenka, Executive Director, Minnesota Grain and Feed Association
2. Gerald Heil, Director of Ag. Marketing & Development, Minnesota Dept. of Agriculture
3. Mark Sackmaster, Director of Transportation, Cenex/Harvest States
4. Chuck Sanft, Planning Director, Office of Investment Management, Mn/DOT
5. Ron Johnson, Director of Trade Development, Duluth Seaway Port Authority
6. George M. Cepress, Office of Management Data Services, Mn/DOT
7. Lloyd T. Host, VP of Marketing, Twin Cities & Western Railroad Company
8. Kimberley Vachal, Upper Great Plains Transportation Instit., North Dakota State University

Technical Liaisons included:

1. Robert Gale, Planner Principal Transportation, Mn/DOT
2. Stephanie Snyder, Project Team Leader, Mn/DOT

The authors wish to thank the following University of Minnesota colleagues for their help in suggesting typical livestock rations as well as necessary numbers of animals to maintain breeding flocks and herds:

Dr. Bill Head, Department of Animal Science
Dr. Jerry Hawton, Department of Animal Science
Dr. Jim Linn, Department of Animal Science
Dr. Sally Noll, Department of Animal Science
Dr. Alfredo DiCostanzo, Department of Animal Science
Chad Zehnder, Department of Animal Science
Andrew Whyte, Department of Applied Economics
Wynn Richardson, Department of Applied Economics
David Schmidt, Department of Biosystems and Agricultural Engineering
Asitha Sandanayake, Department of Applied Economics

TABLE OF CONTENTS

CHAPTER 1	INTRODUCTION	Page 1
CHAPTER 2	PROPOSED ANALYSIS AND DATA	2
CHAPTER 3	BUILDING AND UNDERSTANDING THE WORKBOOK	5
CHAPTER 4	ANALYZING THE WORKSHEETS OF THE WORKBOOK	7
4.1	Detailed Assumptions Imbedded in “Eaters”	9
CHAPTER 5	ANALYSIS AND INTERPRETATIONS	15
CHAPTER 6	SUMMARY	23
END NOTES		24
APPENDIX A.	TABLES	A-1
APPENDIX B.	MAPS	B-1
LIST OF TABLES		
Table 2.1		3
LIST OF FIGURES		
Figure 4.1		7
Figure 5.1		16
Figure 5.2		17
Figure 5.3		19
Figure 5.4		20
Figure 5.5		21

Executive Summary

This study describes a portion of the grain production and movement patterns in Minnesota. 1999 levels of grain and oilseed production were identified as well as livestock populations in individual counties of the state. Animal scientists were consulted to ascribe typical consumption levels by the various livestock living in particular counties. A series of assumptions were required in order to determine the number of additional animals required to maintain sufficient breeding herds and flocks of livestock. Graphs were constructed to present the consumption levels of grain by livestock species in a statewide fashion. Tables provide detailed data to describe the consumption of feed grains and soybean meal by livestock in each county. Use of electronic spreadsheets allowed the authors to determine the extent of feed grain surplus or deficits in particular counties. Geographic Information System (GIS) software allowed the portrayal of several variables by mapping. These included grain production, corn or barley consumption, feed grain surplus or deficit level by county, net grain available for movement out of the county, and net grain available for movement expressed in “tons per square mile of farms”.

Chapter 1

Introduction

A drive through the farming regions of Minnesota during the growing season affords one many views of crops in production. Eventually the thousands and thousands of acres of grains and oilseeds that one observes are harvested. The crops may be stored near the site of production for later feeding or processed in other parts of Minnesota, or they may be shipped away at some appropriate time through the marketing year. The data developed and the analysis presented here seeks to describe the patterns of travel and use of grains and oilseeds originating in Minnesota. Starting from the production levels, this paper first estimates the quantities of feed required in each Minnesota county to feed resident livestock. Residual quantities of crops available to be transported to markets outside of the county of production are reported as well. The ultimate domestic and international destinations of Minnesota's exportable surpluses of corn and soybeans are also reported, based on a sample of rural Minnesota grain elevators participating in a survey sponsored by the Minnesota Grain and Feed Association. In the text, tables, graphs, and maps that follow, one can gain an appreciation of the dynamics of feed usage by livestock raised and finished in Minnesota and the effect of this localized usage of Minnesota grain production on the ultimate amounts and value of Minnesota crops leaving the state.

Chapter 2

Proposed Analysis and Data

Published government statistics and typical animal consumption figures cited by animal scientists provide the base for calculating amounts of grain and soybean meal consumed by the livestock in the state of Minnesota.¹ In addition to the commonly reported livestock classes, animal scientists at the University of Minnesota offered guidance on typical complements of animals raised and retained as replacements for the breeding herds and flocks, as well as the feed necessary to achieve their growth and development. The motivation for determining these amounts stems from the very practical questions surrounding the quantities of grain that must make their way along the roadways, railways, and rivers en route to their ultimate destinations, whether down the road or around the globe. Recent years have witnessed substantial changes in livestock numbers, the types of livestock, the locations of livestock facilities and the size of livestock operations in Minnesota. Grain flow patterns are very dynamic as well, with varying amounts of grain required to fulfill the needs at various destinations. To guide investments in transportation infrastructure for grain movement in Minnesota and beyond, the quantities of production, amounts consumed or utilized in the state, and the paths to ultimate destinations were determined.

Minnesota's agricultural history and economic advantages have brought us to the present situation with respect to the livestock flocks and herds on farms across the state. To make sense of today's situation, classes of livestock were identified along with their unique consumption patterns. The table appearing on the following page contains the various classes of livestock on which this study was based. The classes are unique in terms of their age and production requirements, whether grown as a meat animal, as a replacement in the breeding herd or flock, or for production of milk or eggs. The sources of the animals are also noted to distinguish between animals raised within the state and those that are imported or exported. The numbers of Minnesota animals fed in each class in 1999 and their annual or per head consumption in pounds of corn, soybean meal, and oats are shown below in Table 2.1.

Table 2.1 Livestock Numbers in Classes and Pounds of Feed Consumed

Animal Description	Fed/Year	Corn	Soy. Meal	Oats
Dairy Cows	545,000	5824	1700	
Replacement Dairy Heifers	389,130	2400	1000	
Dairy Herd Bulls	8,135	2912	680	
Growing Replacement Dairy Bulls	4,068	2400	1000	
Dairy Calves Weaned, Raised/Yr.	526,252	750	350	
Beef Cows	385,000	450	50	
Replacement Beef Heifers (calves-yrhg.)	77,000	300	0	
Replacement Beef Heifers (12-24mo.)	77,000	0	0	
Beef Bulls (yearlings & mature)	21,483	2912	680	
Growing Replacement Beef Bulls	10,742	2400	1000	
MN origin beef calves	392,700	185	0	374
MN-Born Dairy Beef	228,671	8223	144	
MN- Born Beef Feeders	267,646	4192	110	
MN-Born Dairy Bf Fed (EX Birth Co.)	34,455	8223	144	
Imported Beef Calves	222,000	4192	110	
Imported Beef Yearlings	74,000	3480	65	
Imported (Phantom) Beef Yearlings	74,000	3480	65	
Ewes & Rams	93,940	330	29	
Creep Feeding of Lambs	115,830	50	5.2	
Replacement Ewes	15,840	115.5	34.5	
Growth & Finishing MN Raised Lambs	99,990	252	36	
Imported Feeder Lambs	51,000	252	36	
Sows & Boars	492,200	1,756	444	
Growing of Young Pigs	9,289,000	76.6	35.4	
Growing of Replacement Gilts	207,000	542	114	
Hogs Finished	11,262,720	542	114	
Laying Hens	12,240,000	56.21	12.05	
Replacement Layer Pullets	3,060,000	24.09	4.2	
Broilers	44,200,000	5.67	2.08	
Turkey Breeder Hens and Toms	540,000	82.6	18.88	
Turkey Replacement Hens & Toms	1,004,400	70	16	
Turkey Consumer Hens (14#)	10,875,000	17.74	8.26	
Turkey Heavy Hens (22#)	10,875,000	35.09	16.55	
Turkey Heavy Toms (36#)	21,750,000	64.72	27.17	

Sources of livestock rations in Table 2.1: All from the Department of Animal Science, University of Minnesota, Dairy--- Dr. Jim Linn, Beef--- Dr. Alfredo DiCostanzo and Chad Zehnder, Sheep--- Dr. William Head, Swine--- Dr. Jerry Hawton, and Poultry --- Dr. Sally Noll.

Ranging from broilers to dairy cows and from brood sows to replacement ewes, thirty-four classes of livestock have been quantified as well as their likely consumption of corn, barley, oats, and soybean meal. For a broiler to be raised from the day it hatches until slaughtered forty-five days later generally requires 2.08 lb. of soybean meal and 5.67 lb. of corn. At the other extreme in size, a dairy cow typically requires 5824 lb of corn and 1700 lb. of soybean meal to maintain herself, produce a calf, and produce 15,000 pounds of milk each year. The dairy cow, the beef steer, and the lamb each consume substantial amounts of forages, as well, such as hay, haylage, and corn silage. However, these feeds are not typically transported very far from the site of production and so are outside consideration for this project.

Because no data is collected on certain important classes of livestock living in the state, their numbers were derived based upon the judgements of animal scientists and recorded figures for other animals of their species. For example, it was necessary to determine the likely complement of replacement dairy heifers that must be raised and kept in order to sustain the dairy cow herd at its reported level. It was necessary to estimate the likely proportion of bulls needed to service the recorded number of cows and heifers. It was also necessary to determine how many replacement bulls are needed to keep bull numbers adequate. The situation was similar for swine and turkeys. With respect to swine, examination of the printed statistics reveals that there are imports of hogs from other states and also Canada. Beef cattle have interesting dynamics with respect to movements of feeder cattle from Minnesota to states such as Iowa and regions to the south as well as movement of calves and yearling from Montana and the Dakotas to Minnesota for finishing. The last five years have witnessed increasing numbers of feeder pigs imported into Minnesota. These animals are represented and have been allocated to “hog-feeding” counties in the **“Eaters”** spreadsheet. All this modeling requires one to make numerous assumptions and I shall attempt to list them all as they occur in the **“Graineaters”** workbook.

Chapter 3.0

Building and Understanding the “Graineaters” Workbook

In order to preserve the many necessary assumptions and then calculate and verify animal numbers, the “**Graineaters**” workbook was created. Like all workbooks, it consists of several worksheets. Working with separate worksheets often helps the researcher keep his calculations under control and separated. In some cases the figures from one of the worksheets are linked and shared with another. In almost all cases the worksheets have the common features of having a listing of the Minnesota counties along the far left column grouped by Crop Reporting Districts. The worksheets also have similar column headings in order to classify various variables by class of consuming livestock. The individual worksheets of the “Graineaters” workbook include the following as described in the following list:

- Grainprod** This worksheet contains the county-by-county production levels of the major grain and oilseed crops in Minnesota in 1999.
- Eaters** This worksheet was used to record (in some cases) and derive (in other cases) the numbers of animals likely to be eating corn, barley, oats, or soybean meal in Minnesota in 1999.
- CornBarpile** This worksheet was used to summarize the amount of corn or barley consumed by each class of livestock in each of the counties and for the state as a whole. Because corn and barley are quite easily substituted, efforts were made to utilize barley by the livestock in counties that produce barley. This worksheet was used to determine the magnitude of corn or barley surplus/deficit.
- SBMpile** This worksheet was used to summarize the amount of soybean meal consumed by each class of livestock in each of the counties and for the state as a whole. With the exception of beef heifers yearlings and older, all the classes of livestock consume some amount of soybean meal.

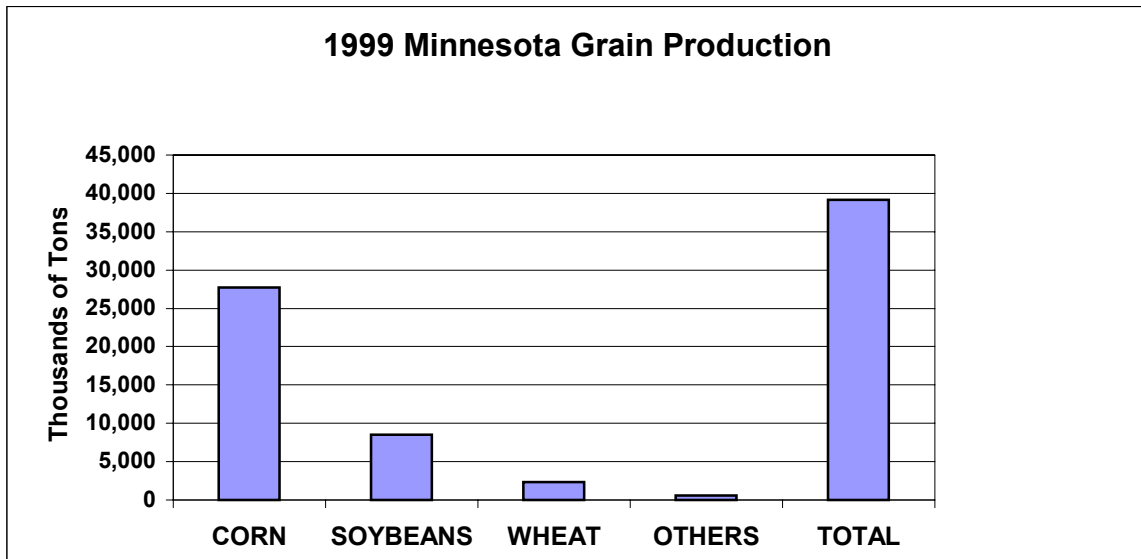
Oatspile	This worksheet was used to summarize the amount of <u>oats</u> consumed in each county. Beef calves are the typical consumers of oats and are the only class of animals identified in this study. There are livestock producers who utilize oats in the rations of other livestock such as sows, boars, and various poultry. However, usage of oats by these individuals was judged to be minor.
NetGrTraf	<u>Net Grain Traffic</u> was calculated by subtracting the 1999 needs of local livestock consumption from levels of production of grain and oilseed production in 1999. This worksheet was also used to identify the net grain imports in the case of certain corn deficit counties.
Mapable	This worksheet contains data in tabular form that has also been classified in order to make maps in ArcView that are presented in this paper.

Chapter 4.0

Analyzing the Worksheets in the “Graineaters” Workbook

A basic understanding of the magnitude of statewide production of grains and oils seeds can be gathered from tables compiled on the **Grainprod** worksheet. The following graph allows one to quickly grasp the volumes of the grains and oilseeds produced in Minnesota in 1999.²

Figure 4.1



Tables A-1 and A-2, which are contained in the **Table Appendix (A)**, give detailed crop production data of the major crops grown in each of the Minnesota counties in terms of bushels and tons, respectively.

The worksheet **Eaters** details the relationships and dynamics of the major livestock categories in Minnesota. As mentioned previously, it was necessary to derive the numbers of the many animals in the breeding herd in order to account for the amounts of feed eaten by these animals. In addition, this worksheet facilitated an accounting of animals as they moved through stages of their lives or took various paths whether as breeding or production animals or whether imported or exported from the state.

This spreadsheet also facilitated efforts to allocate animal numbers to counties for feeding activities by determining the counties with animal numbers increasing above the number produced in the county.

This listing of detailed assumptions and the truncated pages labeled as **Table A-3** in the **Table Appendix (A)** demonstrate how the **Eaters** spreadsheet was set up and how it utilized the many assumptions. In addition, one can note at the top of each column the pounds of corn, soybean meal, and possibly oats fed to the numbered animals in each category. The recording and calculation of data from Eaters continues in the spreadsheet with sixty-one columns ranging from A to BI and rows for the eighty-seven counties of the state.

Chapter 4.1

Detailed Assumptions Imbedded in “Eaters”

As mentioned above, numerous assumptions were necessary to calculate the numbers of many classes of livestock that are not reported to the U.S. Department of Agriculture or the Minnesota Crop and Livestock Reporting Service. Here are notes on each column:

- A This column identifies the Minnesota county and groups counties by Crop Reporting District.
- B This column records the number of cattle recorded for the county as of January 1.³
- C This column records the number of dairy cows.⁴
- D This column contains the **derived** number of dairy heifers, greater than 500 lb. kept for replacements of the milking herd. The number of replacement dairy heifers kept in the herd was determined to be 71.4% of the number of cows.⁵
- E This column contains the **derived** number of bulls required for breeding on Minnesota dairy farms that do not use artificial insemination. Of the females bred on Minnesota dairy farms, there are the cows and senior yearling heifers, which represent 35.7% of the number of cows.⁶ Natural service was occurring for 22 % of all Minnesota dairy cows in 1999. Bull numbers are assumed to equal 5% of the number of heifers and cows to be bred. Based on data published in, bulls require 50% of the energy and 40% of the protein required by lactating dairy cows.⁷
- F This column contains the **derived** number of bulls being raised to replace the bulls used in the dairy herds as they need to be retired. It is assumed that for every two bulls in service, one replacement must be raised. It is assumed that the growing bull will eat a similar amount of corn and soybean meal as a replacement dairy heifer.
- G. This column contains the **derived** number of dairy calves weaned per year. This figure was calculated based on published dairy records of many dairy farms. With 80% of cows being successful in producing a calf and cows giving birth every 14 months instead of every 12 months, one can realize that $.80 \times 12 \text{ months} / 14 \text{ months}$ equals the effective cow reproduction rate of .68 per year. Senior yearling heifers, representing 35.7% of the herd, have an 80% chance of calving in the year as well.

- H. This column is used to **derive** the number of dairy calves (bulls) that are available to be fed as “dairy beef” in Minnesota. It was assumed that 50% of all calves were bulls, and that all are fed out in the Minnesota.
- I. This column contains the recorded number of beef cows as captured in the inventory of cattle on farms.⁸
- J. Based on the number of beef cows (column H.), this column records the **derived** number of beef heifers weighing from 500-800# that farmers are likely to be holding to replace aging cows in their beef herds, which was assumed to be 20% of the number of cows.⁹
- K. Figures in this column are **derived** from the number of beef cows (column H.) and represent beef heifers from twelve to 24 months of age, which is also 20% of the number of cows in the herd.¹⁰
- L. This column contains **derived** figures for the number of beef bulls (yearlings and older) needed for the “beef herd” of each county. This number is based on the requirement of 5% bulls to the number of females to be bred on the 93% of farms using natural service.¹¹
- M. This column contains **derived** figures for the number of replacement beef bulls from 500 pounds until they are yearlings. It was assumed that for every two bulls in service, one replacement must be raised each year as a replacement.
- N. This column contains the **derived** number of beef calves assumed to be born to beef cows in 1999 in each MN county. Estimates of an animal scientist suggest that 85% of the cows and 85% of the older beef heifers will have a living calf each year.¹²
- O. This column **derives** the number of beef feeders after calculating herd replacements for bulls and heifers. One must take calves born and living and subtract the number of replacement heifers and replacement bulls kept from each calf crop. The remainder is then the number of MN born beef calves that are available to be feed out. Some will be fed out in MN and others will be shipped to locations outside the state for feeding. This feeding period is from 80 lb. to 500 lb. It is assumed that no calves are shipped out of MN until they reach 500 pounds.
- P. This column **derives** the number of possible feeders on MN farms based on the numbers of cows, bulls, replacement heifers, and replacement bulls subtracted from the column B, which is “All Cattle on Farms Jan. 1”.¹³ Some of the feeders evident are from other MN counties and others are from other states.

- Q. This column of figures **derived** the number of beef and dairy feeders born in each MN county.
- R. This column contains **derived** numbers of feeders evident in each county and whether or not feeders are being imported or exported from the county. It is calculated by determining the difference between the number of beef and dairy feeders born in each county and the number that are found to be there after the January 1 inventory.
- S. This column contains the **derived** figure of the feeders imported to counties whether from other MN counties or outside of MN.
- T. This column contains the net factor (positive) of imports to each County from MN or elsewhere.
- U. This column utilizes the factor from column T to **derive** the number of feeders as dairy beef feeders in proportion to the percentage dairy feeders represent of both dairy and beef feeders born and raised in the county.
- V. This column **derives** the number of MN born beef feeders that are evident to be fed in the county in the same proportion that beef feeders represent of total dairy and beef feeders.
- W. This column contains the number of feeders necessary to meet the inventory figures. These feeders must have come from other MN counties or from other states.
- X. This column allocates (divvies) “leftover” dairy beef steers not allocated by column U among MN counties that require more feeders to balance with inventory numbers.
- Y. This column allocates (divvies) the beef feeders not allocated by column V. The amount of 8758 beef calves to allocate implies that 37,313 MN-born beef calves were exported for feeding from MN.
- Z. This column **allocates** the numbers and destination counties for beef feeder calves imported into MN and assumes that 60% of the the 370,000 feeder cattle imported into MN are calves, or 222,000 head.¹⁴ The number of imported feeders is allocated in proportion to the net factor of import for feeders (col. T).
- AA This column projects the numbers and destination counties for beef yearlings imported into MN. Based on assumptions that 40% of the 370,000 feeders imported into MN are yearlings and that half or 20% of 370,000, or 74,000 are evident when cattle census is taken January 1.

- AB This column projects the numbers and destination counties for “phantom” beef yearlings imported into MN. (These are called “phantom” yearlings because these animals come into MN, are fed for 180 days and then go to slaughter before their numbers can be noted in the Jan. 1 inventory of cattle.) They are assumed to represent half of all yearlings imported into MN, or 74,000.
- AC This column records the number of breeding sheep and lambs on farms.¹⁵
- AD This column splits out the number of ewes and rams in the breeding sheep herd. Rams are assumed to be 4.4 % of the breeding flock, with ewes representing 81% of the breeding flock.
- AE This columns contains the derived number of lambs creep fed, which is assumed to be 130% of the number of ewes in the breeding flock.
- AF This column derives the number of replacement ewes (14.4%) of the breeding flock, or 18% of the number of ewes, which are needed to keep the breeding herd stable.¹⁶
- AG This column represents the number of growing and finishing lambs being fattened for market by subtracting the number of lambs kept to replace aging ewes.
- AH This column allocates the number of imported feeder lambs among the primary sheep production counties.
- AI This column takes the number of imported feeder lambs and determines the proportion of imported feeder lambs fed in each county.
- AJ This column shows the number of feeder lambs fed in “corn” counties.
- AK This column calculates the number of sows on farms by dividing the number of farrowings by 2.25 per year and also adding in 7% to account for needed boars. It is assumed that sows and boars have the same dietary requirements.¹⁷
- AL This column is the number of annual farrowings recorded by U.S. D. A.¹⁸
- AM This column records the number of pigs saved in each county.¹⁹
- AN This column contains the **derived** number of gilts (equal to 45% of the sow herd that must be replaced each year.
- AO This column contains the 1999 Hog & Pig Inventory as recorded by county.²⁰

- AP This column contains the **derived** annual county balance calculated for finishing hogs. The numbers in this column indicate whether or not hogs are imported or exported for feeding.
- AQ This column identifies the counties that are feeding out hogs for market.
- AR This column calculates the proportion of all hogs finished in each of the “feeding counties”.
- AS The **derived** result in this column represents the number of hogs fed from 45 to 250 pounds in each county.
- AT This figure records the number of chicken laying hens recorded in each county in 1994. These figures were used to scale the 1999 MN Crop and Livestock estimate of state levels.²¹
- AU This column records the calculated proportion of chicken layers assumed to be found in each county in 1999 based on scaling the 1994 figures.
- AV In this column the 1999 statewide number of laying hens is allocated in proportion to the 1994 reported county levels of laying hens.
- AW In this column the number of replacement layers, or pullets, is calculated for each of the counties.
- AX This column contains the number of broilers produced in each county in 1994.²²
- AY With this column the proportion of statewide broiler production is calculated for each of Minnesota’s counties.
- AZ In this column, the 1999 statewide reported figure is allocated among the counties of MN in proportion to the way they occurred in 1994, the last date with county-level resolution.
- BA This column contains the number of turkeys produced in each county in 1994.²³
- BB This column contains the calculated proportion of statewide total that turkey numbers were in each county in 1994.
- BC This column identifies the top 27 “Turkey Production Counties”.

- BD This column contains the **derived** proportion of the turkey breeder flock expected in each county.
- BE This column of figures **derives** the number of turkey breeders, with toms representing 8% of the breeding flocks. The flocks are assumed to eat this diet from weeks 30-58 of their lives. The 1999 statewide turkey breeding flock is thus allocated to counties around the state in proportion to the incidence of turkeys found in 1994.²⁴
- BF This column **derives** the number of turkey replacement hens and toms needed as replacements, and the amount of feed they eat from weeks 0-30 of their lives.²⁵
- BG This column contains the allocated number of turkeys in the “consumer hen” category fed out in each Minnesota County.²⁶
- BH This column contains the allocated number of turkeys in the “heavy hen” category fed out in each MN County.²⁷
- BI This column contains the allocated number of turkeys in the “heavy tom” category fed out in each county.²⁸

The worksheet **CornBarPile**, which refers to the combined feed requirements that can be met by feeding of either corn or barley. On a pound for pound basis, barley is generally considered 88% as effective as corn in feeding most species and classes of livestock.²⁹ In addition, a bushel of barley consists of 48 pounds, while a bushel of corn consists of 56 pounds. To put bushels of barley on an equal nutritional footing with bushels of corn it is necessary to multiply bushels of barley by the factor of .88 and also by .857 (which results from the test weight differences 48/56). Taken together, a bushel of barley is equivalent to .75416 bushels of corn.

Chapter 5.0

Analysis and Interpretations

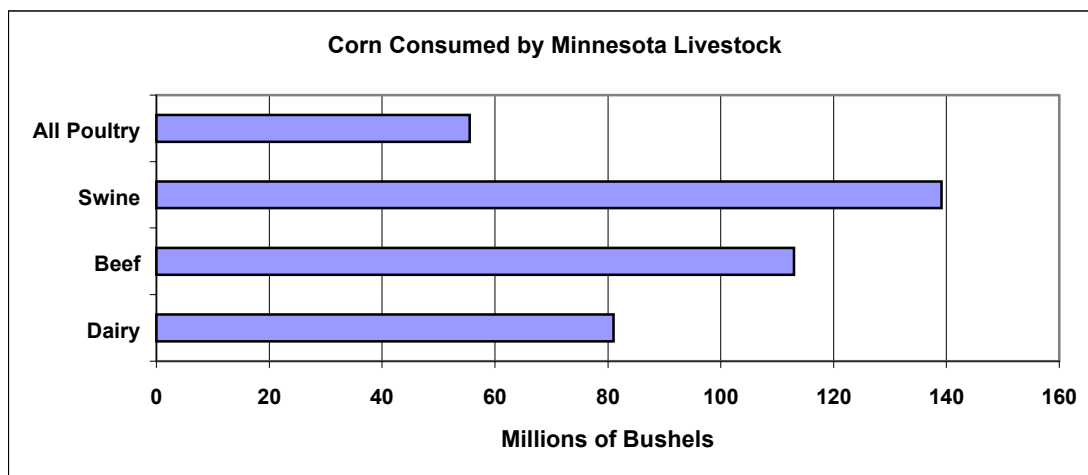
From the data on this worksheet it was possible to determine whether a county was surplus or deficit with respect to the corn equivalents needed to feed the livestock population. **Table A-4**, in the **Table Appendix** contains the county-by-county breakdown of corn equivalent consumption by the various livestock categories in bushels of corn.

The worksheet **SBMpile**, referring to the feed requirements for each category of livestock in each county, compiles the soybean meal by multiplying the dietary requirement by the number of animals in each category for each county (as determined in **Eaters**). This process allowed for the production of tables like those produced for **CornBarPile**, which in this case, identify the amounts of soybean meal consumed by the major categories in each county. The figures are expressed in tons in **Table A-5**, contained in the **Table Appendix**. From this data, **Map B-3** in the **Map Appendix** was derived. The worksheet **Oatspile** offered the same opportunities for analysis, but the situation was simpler with beef calves below 500 pounds as the only consumers of oats.

The worksheet **NetGrTraf**, which refers to “net grain traffic”, repeats the production data from **Grainprod**, but then it subtracts the amounts of grain (corn, oats, and barley) eaten by the livestock in the county to determine the net grain traffic. This figure may be positive or negative, indicating either exports of grains and oilseeds or else the import of feeds. To adjust for size of counties, the figure “Tons of Grain Leaving County” was divided by the number of square miles in farms to gain a sense of the intensity of road use. This variable is mapped in **Map B-5**. In addition, work was carried out in this table to determine the values of grain and oilseeds with such variables as “Value of Grain Production”, “Value of Grain Consumed” and “Value of Net Exports” or (Imports). These figures are compiled in **Table A-7**, contained in the **Table Appendix**. Additionally, it was interesting to learn the percent of county production leaving the county in each case.

Map B-1. , which is contained in the **Map Appendix (B)**, shows that the livestock of Martin County consume the greatest amount of corn of any county in the state, with larger Stearns County just behind, both feeding over twenty million bushels of corn. In contrast, 29 counties (primarily in the northern half of the state or in the metro area) feed less than one million bushels of corn or its equivalent. **Figure 5.1** below shows the consumption of corn by the four major livestock classes in the state.

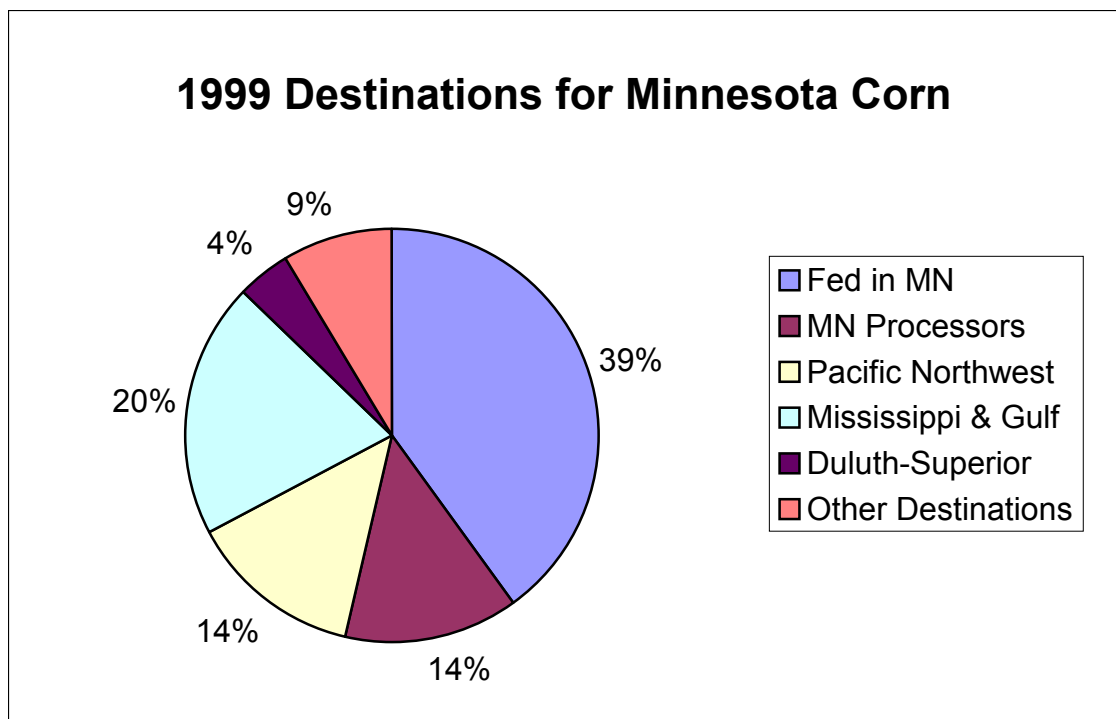
Figure 5.1



Map B-2, contained in the **Map Appendix**, shows the amounts of corn available to be shipped out of each county after meeting its feed requirement (exportable surplus) or the amount that must be imported (feed deficit) into the county. Seventeen northern counties plus Ramsey County in the metro area, have feed deficits. The largest deficit occurs in Becker County, whose livestock population requires the import of 2,438,000 bushels of corn to fulfill the needs of the local livestock. Other counties with high corn imports include the following: Roseau (2,101,954), Todd (2,096,622), Red Lake (2,040,289) and Morrison (1,905,263). Although not shown on the map, the following counties utilize the smallest percentages of their corn production in the feeding of livestock: Traverse (7%), Wilkin (9%), Faribault (9%), and Chippewa (10%).

Besides livestock consumption, large portions of the Minnesota corn crop are processed and exported from the state. **Figure 5.2** displays our estimate of the disposition of Minnesota 1999 corn crop of 990 million bushels. Industrial uses of corn represented by ethanol and sweetener production used 132.5 million bushels of corn, or 13% of the 1999 corn crop, while livestock consumed 390 million bushels, or 39% of the 1999 corn crop. Although industrial processing enterprises have received much publicity in recent years, the consumption of grain by Minnesota livestock remains the dominant value-added activity in the use of grains. One hundred forty million bushels of corn were transported by rail to Pacific Northwest ports for export to Pacific Rim Countries. Approximately 200 million bushels were shipped by barge from the Twin Cities and Winona primarily for export from Gulf Ports, while 40 million bushels were exported by ship from Duluth-Superior. Ninety million bushels went all over North America, primarily by rail to destinations such as Mexico, the Southwest feed market, the Southeast feed market and out of state corn processors.³⁰

Figure 5.2



By 2002 the destination patterns for Minnesota corn can be expected to change in several ways. Foremost is the dramatic expansion of ethanol production in the state that is occurring as a result of the ban on the use of the chemical MTBE as an oxygenate of gasoline in certain domestic markets. Figures supplied by the Minnesota Department of Agriculture identify a 40 percent expansion in this activity to occur between June 2001 and the end of 2002.³¹ The share of the corn crop consumed by Minnesota livestock can be considered stable; however, more plentiful supplies of distillers dried grain and solubles (DDGS) may induce livestock producers to feed more of this feed and less corn and soybean meal. Further growth in corn movements to the Pacific Northwest and Mexico will also occur, primarily at the expense of the shares destined for Duluth-Superior, and the Mississippi River.

Map B- 3, contained in the **Map Appendix**, portrays the tonnages of soybean meal required by resident livestock in each of the counties. From the map one can observe that 45 counties consume less than 20,000 tons of soybean meal each year. However, four counties (Martin, Kandiyohi, Stearns and Morrison) consume from 80,000 to 156,000 tons, which would have required the meal produced from 3,800,000 to 6,500,000 bushels of soybeans. Martin County is the top hog-producing county in the state, while the counties of Kandiyohi, Stearns, and Morrison are major poultry producers. Stearns and Morrison are also major dairy counties.

Figure 5.3 portrays the quantities of soybean meal that are consumed by each of our four livestock categories. Minnesota livestock consumed the soybean meal produced from 97 million bushels of soybeans, or 34 % of the 1999 Minnesota crop. Of the soybean meal eaten by poultry, turkeys eat 78% following by laying hens (14 percent) and broilers (8 percent).

Figure 5.3

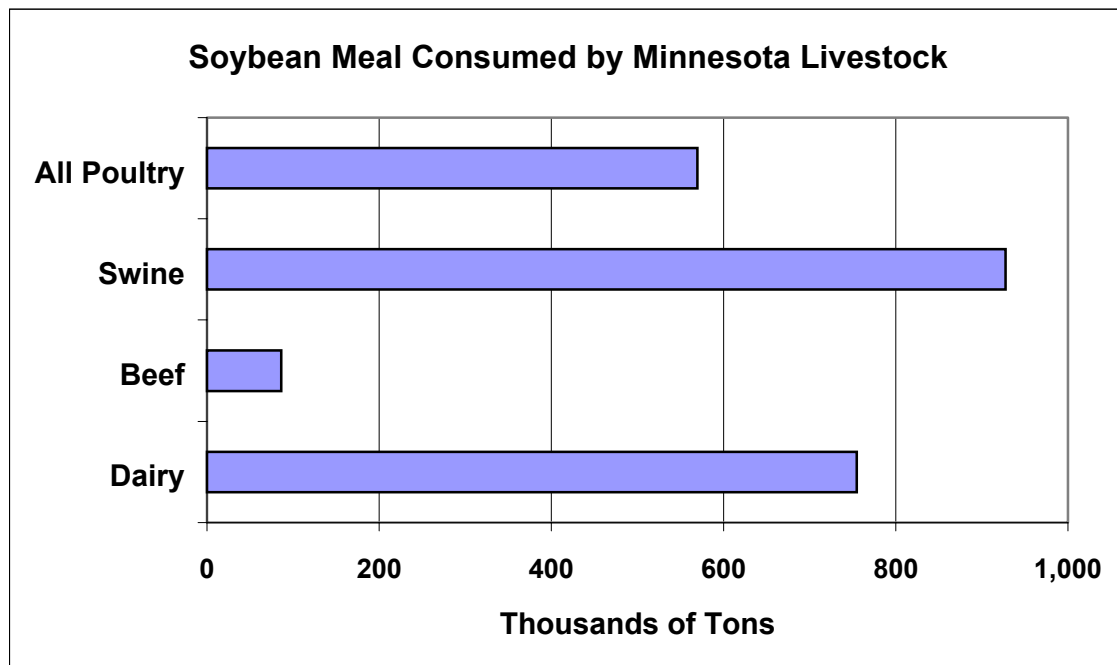
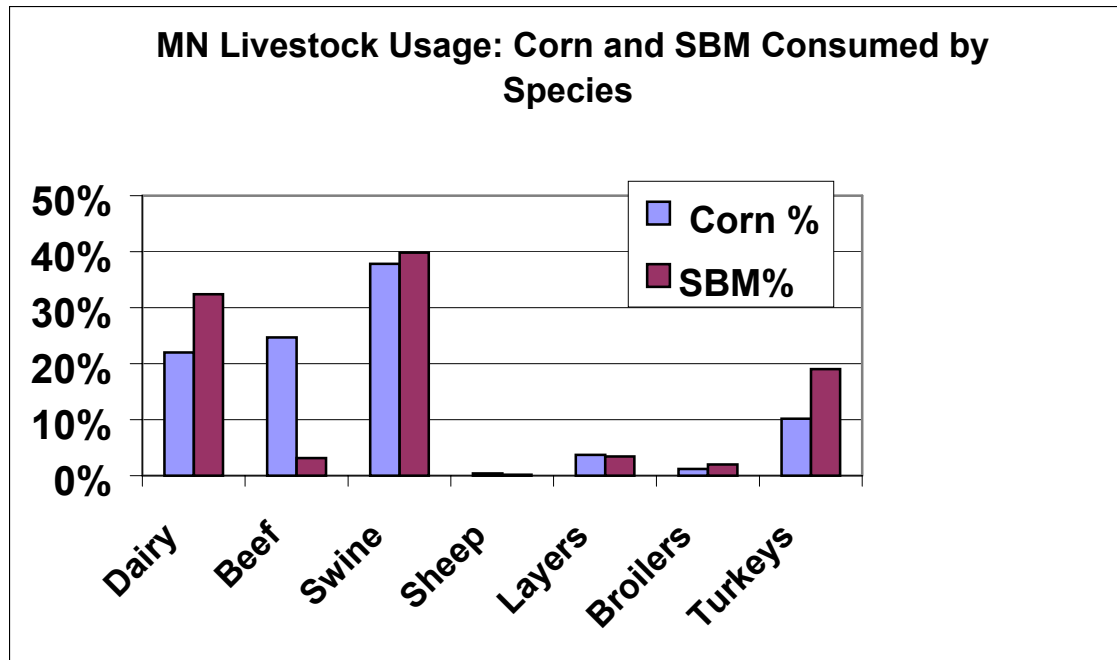


Figure 5.4, which follows, allows a detailed comparison of corn and soybean meal consumption levels among livestock species. Note that laying hens consumed more soybean meal than beef cattle in 1999.

Figure 5.4

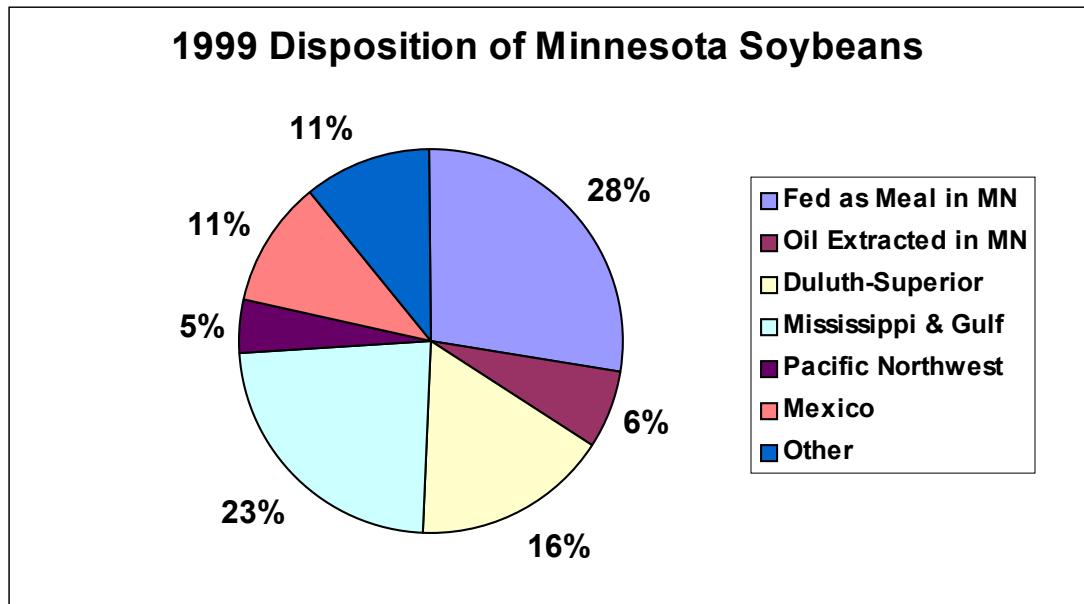


Soybeans are typically transported from counties of production to large, industrial plants where, after processing, oil and protein meal are separated from the raw soybeans. Each sixty pound bushel of soybeans typically yields 47.5 lb. of soybean meal (80% by weight) and 11 lb of soy oil. After soybean crushing and feed formulation and pelleting, soybean meal is transported to the counties with livestock that need it in their rations.

Figure 5.5 shows our estimate of the disposition of the 1999 Minnesota soybean crop of 283 million bushels. Minnesota soybean crushers have the capacity to crush 102 million bushels of soybeans.³² Our calculations determined that 97 million bushels would be necessary to provide the meal being fed in the state, as shown on **Map B-3**. Forty-five million bushels were exported by vessel from Duluth-Superior, while 65 million bushels were shipped by barge down the Mississippi River, primarily for export from Gulf Ports. Over 13 million bushels were shipped by rail to the Pacific Northwest

for export. The remaining 60 plus million bushels traveled primarily by rail to processors in the United States and Mexico.³³

Figure 5.5



Two new soybean crushing plants are being built in Minnesota at the towns of Brewster and Fairmont in 2002. Upon completion, the share of Minnesota soybeans crushed in the state will increase from 34% of the crop to nearly 50% of the state's soybean crop. It is unlikely that livestock numbers will grow in sufficient numbers in the short term to eat the additional soybean meal produced by these new plants. Proposals to produce biodiesel from the oil component of the soybeans crushed in Minnesota have probably not increased the need for expansion in soybean crushing capacity, for there were ample supplies of soybean oil in the state at existing crushing levels.

After reducing county-level grain production by the amounts of corn, barley, and oats consumed by local livestock, one can determine the tonnage of grain and oilseeds requiring transport to processing plants (ethanol, sweeteners, and soy products) as well as to export channels. These figures are expressed in tons and help identify areas of the state where roads and railroads receive the heaviest freight volumes as grain leaves the respective counties. This data is portrayed in **Map B-4**.

Map B-5 is related to **Map B- 4**, starting with the tonnages of grain and oilseeds to be moved out of the counties. In the case of **Map B-5**, the grain and oilseed tonnage figures are then divided by the square miles of farms in each county. For example, Watonwan County will likely export 577,913 tons of grain and oilseeds from its 400 square miles of farms, or 1,445 Tons per square mile of farms, as noted on **Table A-6**, contained in the **Table Appendix**.

Table A-7, in the **Table Appendix**, adds another layer of meaning to the production, consumption, and movement of grain and oilseeds. This table offers information on the value of the crops produced in 1999, the value of the amounts of corn, barley, and oats consumed by livestock, and also the value of the grain exports leaving each county.

Chapter 6.0

Summary

Efforts to quantify and understand the dynamics of livestock consumption of Minnesota produced grains require tenacity, rigor, and the assistance of knowledgeable animals scientists. The intricacies of retaining adequate numbers of young stock to maintain breeding herds and flocks were challenges necessitated by the lack of data about certain animal categories. In this paper a methodology utilizing linked spreadsheets in an Excel workbook was adopted in order to produce verifiable results and managing assumptions. Numerous tables, graphs, and maps were generated in order to express volumes of crops in bushels, tons, and dollars of market value. What has been learned about the importance of livestock consumption of local crops in 1999? With respect to corn, this study identifies the consumption of 37% of the corn crop by livestock. In addition, 34% of the soybean crop is crushed to satisfy the dietary requirements of livestock residing in the state. Review of published data on soybean crushing reveals that current crush capacity is closely matched with the required total amount of soybean meal measured following numerous calculations in this study. A map was produced that visually demonstrates the surplus and deficit counties with respect to the production and usage of corn and barley. There are also areas of the state with excellent production of grains and oilseeds that have minor livestock populations to utilize feed grains. We know that in some cases there is utilization of distillers dried grains and solubles (DDGS) by turkeys, swine, dairy, and beef cattle. However, we have learned from trade sources that the majority of the DDGS produced by Minnesota ethanol plants is dried and shipped out of the state to be fed to livestock in other states.

Further work is underway to refine data on the movement patterns of grain by modes of transportation including trucks, unit trains, and river barges. However, accounting for local patterns of grain and feed consumption is crucial to understanding the volumes of typical Minnesota grain production destined to fulfill needs for human food, livestock feed, and industrial uses beyond Minnesota's borders.

End Notes

-
- ¹ Minnesota Agricultural Statistics 2000, U.S.D.A., National Agricultural Statistics Services and Minnesota Department of Agriculture.
- ² Ibid., pp. 23,24
- ³ Ibid., pp. 72-73.
- ⁴ Ibid., pp. 74-75.
- ⁵ Interview: Dr. Gerald Stuernagel. Department of Animal Science, University of Minnesota, and review of “Minnesota Dairy Herd Improvement Breed Averages,” December 2000.
- ⁶ Table of Supporting Data in “Dairy Champ,” dairy management software, University of Minnesota, Department of Applied Economics.
- ⁷ Frank B. Morrison, Feeds and Feeding, Abridged. Morrison Publishing Company, Ninth Edition, 1961. pp. 625-626.
- ⁸ Minnesota Agricultural Statistics 2000, U.S.D.A., N.A.S.S., pp. 74-75.
- ⁹ Interview: Chad Zehnder. Department of Animal Science, University of Minnesota, December 2000.
- ¹⁰ Ibid.
- ¹¹ Ibid.
- ¹² Ibid.
- ¹³ Minnesota Agricultural Statistics 2000, U.S.D.A., N.A.S.S., pp. 72-73.
- ¹⁴ Ibid.
- ¹⁵ Ibid.
- ¹⁶ Interview: Dr. Bill Head. Department of Animal Science, University of Minnesota, December 2000.
- ¹⁷ Minnesota Agricultural Statistics 2000, U.S.D.A., N.A.S.S., pp. 78-79.
- ¹⁸ Ibid.
- ¹⁹ Ibid.
- ²⁰ Ibid.
- ²¹ “Feasibility Study on Processing Manure on an Areawide Scale,” Phase I Study: Review of Technologies for Processing Manure, Bolton & Menk, Inc., under contract to Minnesota Department of Agriculture, August 1995.
- ²² Ibid.

²³ Ibid.

²⁴ Interview: Dr. Sally Noll. Department of Animal Science, University of Minnesota, December 2000.

²⁵ Ibid.

²⁶ Ibid.

²⁷ Ibid.

²⁸ Ibid.

²⁹ Frank B. Morrison, Feeds and Feeding, Abridged. Ninth Edition, 1961. Morrison Publishing Company. pp. 295.

³⁰ Jerry Fruin and Douglas G. Tiffany. "Where Does Minnesota's Grain Crop Go? An Analysis of Minnesota Elevator Grain Shipments, 7/99-6/00," Staff Paper Series, University of Minnesota, Department of Applied Economics, September 2001.

³¹ Interview: Ralph Groschen. Minnesota Department of Agriculture, Marketing Division. Interview Sept. 14, 2001.

³² Robert W. Carlson, "Opportunities for Value-Added Utilization of Oilseeds and Oilseed Products in Minnesota," Agricultural Utilization and Research Institute, Marshall, MN, September 2000. p. 28.

³³ Ibid. Fruin and Tiffany.

APPENDIX A

TABLES

TABLE A-1

1999 MINNESOTA GRAIN AND OILSEED PRODUCTION BY COUNTY (BU)

COUNTY & DISTRICT	CORN F/GR.	SOYBEANS	OATS	BARLEY	RYE	WHEAT	FLAX	SUNFLWR
Test Weight/Bushel	56	60	32	48	56	60	56	(24)Pounds/BU
BECKER	1,015,200	1,593,000	339,700	91,000	0	2,417,000	0	2,595,000
CLAY	4,284,000	4,219,400	268,000	550,800	0	7,329,900	0	25,820,000
CLEARWATER	145,500	61,600	159,100	84,000	0	141,400	0	1,430,000
KITTSO	457,500	861,300	261,000	1,259,600	42,900	7,918,400	160,000	13,735,000
MAHNOMEN	581,400	1,055,700	79,200	156,000	0	1,508,100	0	2,650,000
MARSHALL	309,600	1,214,400	112,200	820,800	25,200	5,841,500	36,000	8,885,000
NORMAN	2,120,400	3,625,000	124,800	634,800	0	7,455,900	0	20,925,000
PENNINGTON	152,000	437,500	165,600	140,400	0	1,077,800	0	4,735,000
POLK	3,355,000	5,286,700	324,800	841,800	0	13,416,900	0	26,405,000
RED LAKE	346,500	1,155,000	259,600	255,000	0	1,685,000	0	6,530,000
ROSEAU	68,200	48,000	156,400	245,000	0	1,983,600	15,200	4,335,000
D10 COMBINED COUNTIES	0	0	0	0	66,100	0	66,500	0
D10 NORTHWEST	12,835,300	19,557,600	2,250,400	5,079,200	134,200	50,775,500	277,700	118,045,000
BELTRAMI	9,000	0	171,600	30,800	0	105,200	0	0
CASS	197,200	0	38,400	0	0	0	0	0
HUBBARD	1,377,500	0	92,400	0	0	27,600	0	0
ITASCA	0	0	62,400	0	0	0	0	0
KOOCHICHING	0	0	22,200	0	0	0	0	0
LAKE OF THE WOODS	0	0	19,800	0	0	132,800	0	0
D20 COMBINED COUNTIES	10,700	0	0	39,200	0	15,800	0	905,000
D20 NORTH CENTRAL	1,594,400	0	406,800	70,000	0	281,400	0	905,000
COOK	0	0	0	0	0	0	0	0
LAKE	0	0	0	0	0	0	0	0
ST. LOUIS	0	0	67,200	0	0	0	0	0
D30 COMBINED COUNTIES	8,500	0	0	9,300	0	4,600	0	0
D30 NORTHEAST	8,500	0	67,200	9,300	0	4,600	0	0

A-1

TABLE A-1

COUNTY & DISTRICT	CORN F/GR.	SOYBEANS	OATS	BARLEY	RYE	WHEAT	FLAX	SUNFLWR
Test Weight/Bushel	56	60	32	48	56	60	56	(24)Pounds/BU
BIG STONE	9,716,100	4,449,800	0	0	0	1,861,500	0	0
CHIPPEWA	23,522,200	5,940,000	75,000	0	0	204,000	0	0
DOUGLAS	4,912,500	2,412,000	455,400	112,500	0	920,100	0	0
GRANT	8,011,500	4,600,000	0	146,200	0	3,600,000	0	0
LAC QUI PARLE	21,598,200	7,187,700	0	0	0	728,900	0	0
OTTER TAIL	16,118,400	4,040,000	1,555,500	281,600	17,500	3,229,200	0	9,005,000
POPE	12,684,000	3,645,600	262,200	0	0	676,200	0	0
STEVENS	19,002,600	5,520,000	0	0	0	1,403,500	0	0
SWIFT	23,392,600	6,372,000	113,600	0	0	381,300	0	0
TRAVERSE	12,637,800	5,413,200	0	156,000	0	3,289,100	0	0
WILKIN	5,133,800	4,985,600	58,500	582,400	0	7,921,900	0	23,270,000
YELLOW MEDICINE	25,929,600	7,980,000	81,000	0	0	553,400	0	0
D40 COMBINED COUNTIES	0	0	157,000	122,700	10,900	0	0	3,140,000
D40 WEST CENTRAL	182,659,300	62,545,900	2,758,200	1,401,400	28,400	24,769,100	0	35,415,000
BENTON	6,695,000	760,500	279,000	78,200	55,800	0	0	0
CARVER	8,468,600	2,023,700	171,600	0	0	66,000	0	0
KANDIYOH	21,772,800	5,359,500	262,300	0	0	302,400	0	0
MCLEOD	15,889,500	4,483,800	240,000	0	0	174,800	0	0
MEEKER	15,302,700	4,863,600	214,500	55,200	0	213,200	0	0
MORRISON	9,410,700	452,400	592,200	107,500	105,600	39,100	0	2,100,000
RENVILLE	40,729,600	11,233,200	0	0	0	196,700	0	0
SCOTT	5,636,400	1,440,600	130,000	0	0	0	0	0
SHERBURNE	3,729,600	410,400	0	0	62,100	0	0	0
SIBLEY	20,451,000	6,142,900	134,900	0	0	109,700	0	0
STEARNS	20,560,500	3,620,300	1,995,000	330,000	84,000	166,400	0	0
TODD	5,247,000	824,600	756,000	189,200	57,800	223,800	0	5,120,000
WADENA	1,642,800	66,500	279,000	61,500	0	0	0	0
WRIGHT	9,478,000	2,986,200	226,200	40,800	0	122,100	0	0
D50 COMBINED COUNTIES	0	0	139,200	106,300	23,200	100,200	0	695,000
D50 CENTRAL	185,014,200	44,668,200	5,419,900	968,700	388,500	1,714,400	0	7,915,000

TABLE A-1

COUNTY & DISTRICT	CORN F/GR.	SOYBEANS	OATS	BARLEY	RYE	WHEAT	FLAX	SUNFLWR
Test Weight/Bushel	56	60	32	48	56	60	56	(24)Pounds/BU
AITKIN	20,000	0	0	0	0	0	0	0
ANOKA	924,000	169,200	0	0	49,500	0	0	0
CARLTON		0	0	0	0	0	0	0
CHISAGO	2,702,200	758,200	73,500	0	0	0	0	0
CROW WING	490,000	0	104,400	0	0	0	0	0
HENNEPIN	2,323,200	592,000	53,000	0	0	0	0	0
ISANTI	4,012,000	953,600	55,900	0	64,400	41,800	0	0
KANABEC	1,649,700	234,000	118,800	0	0	40,900	0	0
MILLE LACS	2,334,500	345,600	81,700	0	0	0	0	0
PINE	1,447,200	245,000	180,200	0	0	0	0	0
RAMSEY	0	0	0	0	0	0	0	0
WASHINGTON	2,970,000	676,200	82,800	0	0	0	0	0
D60 COMBINED COUNTIES	22,800	16,000	45,900	125,000	52,400	135,600	0	0
D60 EAST CENTRAL	18,895,600	3,989,800	796,200	125,000	166,300	218,300	0	0
COTTONWOOD	26,377,200	7,236,600	0	0	0	0	0	0
JACKSON	26,610,400	7,380,000	0	0	0	0	0	0
LINCOLN	11,200,500	3,873,900	207,200	0	0	384,000	0	0
LYON	24,336,000	7,333,200	136,800	0	0	222,600	0	0
MURRAY	25,300,200	7,484,400	290,400	0	0	0	0	0
NOBLES	27,341,600	7,996,800	200,100	0	0	0	0	0
PIPESTONE	11,920,500	4,415,700	224,000	134,000	0	0	0	0
REDWOOD	37,310,700	10,251,000	98,400	0	0	153,700	0	0
ROCK	18,329,400	5,904,000	180,600	0	0	0	0	0
D70 COMBINED COUNTIES	0	0	126,800	152,900	0	138,300	0	0
D70 SOUTHWEST	208,726,500	61,875,600	1,464,300	286,900	0	898,600	0	0

TABLE A-1

COUNTY & DISTRICT	CORN F/GR.	SOYBEANS	OATS	BARLEY	RYE	WHEAT	FLAX	SUNFLWR
Test Weight/Bushel	56	60	32	48	56	60	56	(24)Pounds/BU
BLUE EARTH	27,867,500	7,845,200	0	0	0	0	0	0
BROWN	23,149,800	6,168,800	223,200	0	0	88,800	0	0
FARIBAULT	29,159,300	7,156,800	0	0	0	0	0	0
FREEBORN	25,396,800	6,360,000	117,800	0	0	0	0	0
LE SUEUR	12,945,000	3,740,000	92,400	0	0	75,200	0	0
MARTIN	32,802,000	7,921,200	115,200	0	0	0	0	0
NICOLLET	17,958,000	5,030,400	161,700	0	0	62,100	0	0
RICE	12,489,400	3,092,600	179,200	0	0	0	0	0
STEELE	14,786,200	3,859,800	120,000	0	0	0	0	0
WASECA	17,771,600	4,488,000	51,300	0	0	0	0	0
WATONWAN	19,690,300	5,086,900	0	0	0	0	0	0
D80 COMBINED COUNTIES	0	0	151,800	75,300	0	163,300	0	0
D80 SOUTH CENTRAL	234,015,900	60,749,700	1,212,600	75,300	0	389,400	0	0
DAKOTA	13,213,200	3,005,200	95,200	0	0	56,500	0	0
DODGE	16,106,700	3,990,400	121,600	0	0	0	0	0
FILLMORE	22,466,700	4,518,000	665,000	113,400	0	0	0	0
GOODHUE	19,812,000	3,951,200	481,000	104,400	0	0	0	0
HOUSTON	9,486,000	1,214,400	291,400	45,600	0	0	0	0
MOWER	25,670,000	7,056,000	186,300	0	0	0	0	0
OLMSTED	15,996,000	3,136,500	384,400	0	0	0	0	0
WABASHA	11,801,200	1,670,400	542,700	61,200	0	0	0	0
WINONA	11,698,500	950,400	556,800	66,300	0	0	0	0
D90 COMBINED COUNTIES	0	0	0	53,300	0	102,200	0	0
D90 SOUTHEAST	146,250,300	29,492,500	3,324,400	444,200	0	158,700	0	0
D98 COMBINED COUNTIES	0	20,700	0	0	57,600	0	22,300	970,000
D98 COMBINED DISTRICTS	0	20,700	0	0	57,600	0	22,300	970,000
STATE TOTAL	990,000,000	282,900,000	17,700,000	8,460,000	775,000	79,210,000	300,000	163,250,000

TABLE A-2

1999 MINNESOTA GRAIN AND OILSEED PRODUCTION BY COUNTY (TONS)

A-5

COUNTY & DISTRICT	Corn F/GR Tons	Soybeans Tons	OATS Tons	BARLEY Tons	RYE Tons	WHEAT Tons	FLAX Tons	SUNFLW Tons	Total Grain Prod. Tons
BECKER	28,426	47,790	5,435	2,184	0	72,510	0	1,298	157,642
CLAY	119,952	126,582	4,288	13,219	0	219,897	0	12,910	496,848
CLEARWATER	4,074	1,848	2,546	2,016	0	4,242	0	715	15,441
KITTSO	12,810	25,839	4,176	30,230	1,201	237,552	4,480	6,868	323,156
MAHNOMEN	16,279	31,671	1,267	3,744	0	45,243	0	1,325	99,529
MARSHALL	8,669	36,432	1,795	19,699	706	175,245	1,008	4,443	247,996
NORMAN	59,371	108,750	1,997	15,235	0	223,677	0	10,463	419,493
PENNINGTON	4,256	13,125	2,650	3,370	0	32,334	0	2,368	58,102
POLK	93,940	158,601	5,197	20,203	0	402,507	0	13,203	693,651
RED LAKE	9,702	34,650	4,154	6,120	0	50,550	0	3,265	108,441
ROSEAU	1,910	1,440	2,502	5,880	0	59,508	426	2,168	73,833
D10 COMBINED COUNTIES	0	0	0	0	1,851	0	1,862	0	3,713
D10 NORTHWEST	359,388	586,728	36,006	121,901	3,758	1,523,265	7,776	59,023	2,697,844
BELTRAMI	252	0	2,746	739	0	3,156	0	0	6,893
CASS	5,522	0	614	0	0	0	0	0	6,136
HUBBARD	38,570	0	1,478	0	0	828	0	0	40,876
ITASCA	0	0	998	0	0	0	0	0	998
KOOCHICHING	0	0	355	0	0	0	0	0	355
LAKE OF THE WOODS	0	0	317	0	0	3,984	0	0	4,301
D20 COMBINED COUNTIES	300	0	0	941	0	474	0	453	2,167
D20 NORTH CENTRAL	44,643	0	6,509	1,680	0	8,442	0	453	61,727
COOK	0	0	0	0	0	0	0	0	0
LAKE	0	0	0	0	0	0	0	0	0
ST. LOUIS	0	0	1,075	0	0	0	0	0	1,075
D30 COMBINED COUNTIES	238	0	0	223	0	138	0	0	599
D30 NORTHEAST	238	0	1,075	223	0	138	0	0	1,674

TABLE A-2

COUNTY & DISTRICT	Corn F/GR	Soybeans	OATS	BARLEY	RYE	WHEAT	FLAX	SUNFLW	Total Grain Prod.
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
BIG STONE	272,051	133,494	0	0	0	55,845	0	0	461,390
CHIPPEWA	658,622	178,200	1,200	0	0	6,120	0	0	844,142
DOUGLAS	137,550	72,360	7,286	2,700	0	27,603	0	0	247,499
GRANT	224,322	138,000	0	3,509	0	108,000	0	0	473,831
LAC QUI PARLE	604,750	215,631	0	0	0	21,867	0	0	842,248
OTTER TAIL	451,315	121,200	24,888	6,758	490	96,876	0	4,503	706,030
POPE	355,152	109,368	4,195	0	0	20,286	0	0	489,001
STEVENS	532,073	165,600	0	0	0	42,105	0	0	739,778
SWIFT	654,993	191,160	1,818	0	0	11,439	0	0	859,409
TRAVERSE	353,858	162,396	0	3,744	0	98,673	0	0	618,671
WILKIN	143,746	149,568	936	13,978	0	237,657	0	11,635	557,520
YELLOW MEDICINE	726,029	239,400	1,296	0	0	16,602	0	0	983,327
D40 COMBINED COUNTIES	0	0	2,512	2,945	305	0	0	1,570	7,332
D40 WEST CENTRAL	5,114,460	1,876,377	44,131	33,634	795	743,073	0	17,708	7,830,178
BENTON	187,460	22,815	4,464	1,877	1,562	0	0	0	218,178
CARVER	237,121	60,711	2,746	0	0	1,980	0	0	302,557
KANDIYOH	609,638	160,785	4,197	0	0	9,072	0	0	783,692
MCLEOD	444,906	134,514	3,840	0	0	5,244	0	0	588,504
MEEKER	428,476	145,908	3,432	1,325	0	6,396	0	0	585,536
MORRISON	263,500	13,572	9,475	2,580	2,957	1,173	0	1,050	294,307
RENVILLE	1,140,429	336,996	0	0	0	5,901	0	0	1,483,326
SCOTT	157,819	43,218	2,080	0	0	0	0	0	203,117
SHERBURNE	104,429	12,312	0	0	1,739	0	0	0	118,480
SIBLEY	572,628	184,287	2,158	0	0	3,291	0	0	762,364
STEARNS	575,694	108,609	31,920	7,920	2,352	4,992	0	0	731,487
TODD	146,916	24,738	12,096	4,541	1,618	6,714	0	2,560	199,183
WADENA	45,998	1,995	4,464	1,476	0	0	0	0	53,933
WRIGHT	265,384	89,586	3,619	979	0	3,663	0	0	363,231
D50 COMBINED COUNTIES	0	0	2,227	2,551	650	3,006	0	348	8,782
D50 CENTRAL	5,180,398	1,340,046	86,718	23,249	10,878	51,432	0	3,958	6,696,678

TABLE A-2

COUNTY & DISTRICT	Corn F/GR	Soybeans	OATS	BARLEY	RYE	WHEAT	FLAX	SUNFLW	Total Grain Prod.
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
AITKIN	560	0	0	0	0	0	0	0	560
ANOKA	25,872	5,076	0	0	1,386	0	0	0	32,334
CARLTON	0	0	0	0	0	0	0	0	0
CHISAGO	75,662	22,746	1,176	0	0	0	0	0	99,584
CROW WING	13,720	0	1,670	0	0	0	0	0	15,390
HENNEPIN	65,050	17,760	848	0	0	0	0	0	83,658
ISANTI	112,336	28,608	894	0	1,803	1,254	0	0	144,896
KANABEC	46,192	7,020	1,901	0	0	1,227	0	0	56,339
MILLE LACS	65,366	10,368	1,307	0	0	0	0	0	77,041
PINE	40,522	7,350	2,883	0	0	0	0	0	50,755
RAMSEY	0	0	0	0	0	0	0	0	0
WASHINGTON	83,160	20,286	1,325	0	0	0	0	0	104,771
D60 COMBINED COUNTIES	638	480	734	3,000	1,467	4,068	0	0	10,388
D60 EAST CENTRAL	529,077	119,694	12,739	3,000	4,656	6,549	0	0	675,715
COTTONWOOD	738,562	217,098	0	0	0	0	0	0	955,660
JACKSON	745,091	221,400	0	0	0	0	0	0	966,491
LINCOLN	313,614	116,217	3,315	0	0	11,520	0	0	444,666
LYON	681,408	219,996	2,189	0	0	6,678	0	0	910,271
MURRAY	708,406	224,532	4,646	0	0	0	0	0	937,584
NOBLES	765,565	239,904	3,202	0	0	0	0	0	1,008,670
PIPESTONE	333,774	132,471	3,584	3,216	0	0	0	0	473,045
REDWOOD	1,044,700	307,530	1,574	0	0	4,611	0	0	1,358,415
ROCK	513,223	177,120	2,890	0	0	0	0	0	693,233
D70 COMBINED COUNTIES	0	0	2,029	3,670	0	4,149	0	0	9,847
D70 SOUTHWEST	5,844,342	1,856,268	23,429	6,886	0	26,958	0	0	7,757,882

TABLE A-2

COUNTY & DISTRICT	Corn F/GR Tons	Soybeans Tons	OATS Tons	BARLEY Tons	RYE Tons	WHEAT Tons	FLAX Tons	SUNFLW Tons	Total Grain Prod. Tons
BLUE EARTH	780,290	235,356	0	0	0	0	0	0	1,015,646
BROWN	648,194	185,064	3,571	0	0	2,664	0	0	839,494
FARIBAULT	816,460	214,704	0	0	0	0	0	0	1,031,164
FREEBORN	711,110	190,800	1,885	0	0	0	0	0	903,795
LE SUEUR	362,460	112,200	1,478	0	0	2,256	0	0	478,394
MARTIN	918,456	237,636	1,843	0	0	0	0	0	1,157,935
NICOLLET	502,824	150,912	2,587	0	0	1,863	0	0	658,186
RICE	349,703	92,778	2,867	0	0	0	0	0	445,348
STEELE	414,014	115,794	1,920	0	0	0	0	0	531,728
WASECA	497,605	134,640	821	0	0	0	0	0	633,066
WATONWAN	551,328	152,607	0	0	0	0	0	0	703,935
D80 COMBINED COUNTIES	0	0	2,429	1,807	0	4,899	0	0	9,135
D80 SOUTH CENTRAL	6,552,445	1,822,491	19,402	1,807	0	11,682	0	0	8,407,827
DAKOTA	369,970	90,156	1,523	0	0	1,695	0	0	463,344
DODGE	450,988	119,712	1,946	0	0	0	0	0	572,645
FILLMORE	629,068	135,540	10,640	2,722	0	0	0	0	777,969
GOODHUE	554,736	118,536	7,696	2,506	0	0	0	0	683,474
HOUSTON	265,608	36,432	4,662	1,094	0	0	0	0	307,797
MOWER	718,760	211,680	2,981	0	0	0	0	0	933,421
OLMSTED	447,888	94,095	6,150	0	0	0	0	0	548,133
WABASHA	330,434	50,112	8,683	1,469	0	0	0	0	390,698
WINONA	327,558	28,512	8,909	1,591	0	0	0	0	366,570
D90 COMBINED COUNTIES	0	0	0	1,279	0	3,066	0	0	4,345
D90 SOUTHEAST	4,095,008	884,775	53,190	10,661	0	4,761	0	0	5,048,396
D98 COMBINED COUNTIES	0	621	0	0	1,613	0	624	485	3,343
D98 COMBINED DISTRICTS	0	621	0	0	1,613	0	624	485	3,343
STATE TOTAL	27,720,000	8,487,000	283,200	203,040	21,700	2,376,300	8,400	81,625	39,181,265

A-8

TABLE A-3

A	B	C	D	E	F	G	H	I	J
	All Cattle (Jan 1 Census)	1999 Dairy Cows	Replacmt Dairy Heifers	Dairy Herd Bulls .5corn,.4S BM	Growing Replace- ment Dairy Bulls	Dairy Calves Weaned, Raised Per Year	Source of Dairy Beef Feeders (DIVVY)	Beef Cows	Replaceme nt Beef Heifers
		1300#	500-1300#		500-1500#	100-500#	500-1300	1300 #	500-800 #
		5824	2400	2912	2400	750		450	300
		1700	1000	680	1000	350		50	0
Corn									
Soybean Meal									
Oats									
BECKER	37,000	9,600	6,854	143	72	9,270	4,635	8,000	1,600
CLAY	18,500	2,600	1,856	39	19	2,511	1,255	4,500	900
CLEARWATER	25,600	1,600	1,142	24	12	1,545	772	10,000	2,000
KITTSO	12,500	1,300	928	19	10	1,255	628	5,500	1,100
MAHNOMEN	13,200	2,100	1,499	31	16	2,028	1,014	3,000	600
MARSHALL	17,100	1,900	1,357	28	14	1,835	917	5,500	1,100
NORMAN	11,800	2,100	1,499	31	16	2,028	1,014	3,000	600
PENNINGTON	8,800	1,100	785	16	8	1,062	531	3,500	700
POLK	28,800	3,600	2,570	54	27	3,476	1,738	9,000	1,800
RED LAKE	12,700	1,400	1,000	21	10	1,352	676	4,500	900
ROSEAU	28,000	3,500	2,499	52	26	3,380	1,690	9,000	1,800

TABLE A-3

	K	L	M	N	O	P	Q	R	S	T	U	V
	Replmt. Beef Heifers (12-24) mo.	Beef Bulls Yearlings & Mature	Growing Replacemt Beef Bulls >500 lb.	MN ORIG. Beef Calves	Derived Possible MN Beef Feeders	Net Poss. Feeders on Farms f/Census (Calves&Ye arlings)	Derived MN Dairy&BF Feeders	Net Imp./Exp. of Feeders Evident	Net Feeders Importd. to Counties fr. MN and Elsewhere	Factor of Net Imports to County fr/ MN & Elsewhere	Destination Counties: MN-Born Dairy Beef	Destination Counties: MN Born Beef Feeders
	800-1300	1300-2000	500-1300	80-500#								
	0	2912	2400	185							8223	4192
	0	680	1000	0							144	110
				374								
A-10	1,600	446	223	8,160	6,337	5,715	10,972	(5,256)		0.000000	2,414	3,301
	900	251	126	4,590	3,564	6,565	4,820	1,745	1,745	0.005144	1,255	3,564
	2,000	558	279	10,200	7,921	7,527	8,693	(1,166)		0.000000	669	6,858
	1,100	307	153	5,610	4,357	1,711	4,984	(3,274)		0.000000	215	1,495
	600	167	84	3,060	2,376	4,502	3,390	1,112	1,112	0.003278	1,014	2,376
	1,100	307	153	5,610	4,357	5,097	5,274	(177)		0.000000	887	4,211
	600	167	84	3,060	2,376	3,102	3,390	(288)		0.000000	928	2,174
	700	195	98	3,570	2,772	1,382	3,303	(1,921)		0.000000	222	1,160
	1,800	502	251	9,180	7,129	8,166	8,867	(701)		0.000000	1,601	6,565
	900	251	126	4,590	3,564	3,192	4,240	(1,048)		0.000000	509	2,683
	1,800	502	251	9,180	7,129	7,568	8,819	(1,250)		0.000000	1,450	6,118

TABLE A-3

	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
	Feeders Necessary to Meet Inventory	Divvy Left- over MN Dairy Beef	Divvy Left- Over MN Beef	Imported Beef Calves	Imported Beef Yearlings 180 days	Imported Phantom Beef Yearlings	Breeding Sheep and Lambs	Ewes 165 day lactation, &Rams	Creep Lambs for 52 days	Replacmnt Ewes@ 18% of ewe flock, 75 days	GR & Fin lambs 90 days	Imported Feeder Lambs
		500-1200#	500-1200#	700-1280#	700-1280#			160#	25-60#	60-100#	60-130#	60-130#
			.6 feeders	.4 feeders	.4 feeders			.81*q	1.30X ewe	.15X ewes	aa-ab	
	8223	4192	4192	3480	3480			330	50	115.5	252	252
	144	110	110	65	65			29	5.2	34.5	36	36
A-11	0	0	0	0	0	0	800	683	842	115	727	0
	1,745	177	45	1,142	381	381	800	683	842	115	727	0
	0	0	0	0	0	0	1,100	939	1,158	158	1,000	0
	0	0	0	0	0	0	600	512	632	86	545	0
	1,112	113	29	728	243	243	100	85	105	14	91	0
	0	0	0	0	0	0	1,500	1,281	1,580	216	1,364	0
	0	0	0	0	0	0	100	85	105	14	91	0
	0	0	0	0	0	0	100	85	105	14	91	0
	0	0	0	0	0	0	800	683	842	115	727	0
	0	0	0	0	0	0	900	769	948	130	818	0
	0	0	0	0	0	0	700	598	737	101	636	0

TABLE A-3

AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS
Divvy Imported Feeder Lambs	Statewide Tot. Sheep Proportion in "Corn Counties"	Sows and 7% Boars	Annual Farrowings	Ann. MN Pigs Savd.	MN Replacmt Gilts@ 45% Sow Herd	99 Hog & Pig Inventory	Net Annual County Balance Calc. F/ Finishing Hogs	Counties Feeding Out Hogs	Proport. of All Hogs Finished by "Feeding Counties"	Hogs Finished
		450#		15-45#	45-250#					45-250#
		1756		76.6	542					542
		444		35.4	114					114
0	0	999	2,100	18,000	420	7,100	(1,495)	0	0	0
0		999	2,100	19,000	420	9,500	493	493	0.0004202	4,733
0		48	100	750	20	500	135	135	0.00011498	1,295
0		95	200	1,500	40	2,200	1,470	1,470	0.00125258	14,107
0		143	300	2,500	60	3,000	1,802	1,802	0.00153536	17,292
0		143	300	2,500	60	800	(398)		0	0
0		428	900	8,000	180	6,800	2,999	2,999	0.00255555	28,782
0		95	200	1,500	40	1,100	370	370	0.00031517	3,550
0		1,094	2,300	20,000	460	8,400	(1,131)		0	0
0		48	100	750	20	600	235	235	0.0002002	2,255
0		190	400	3,000	80	2,000	540	540	0.00045991	5,180

TABLE A-3

	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE
	94 Layers Count	Layer Proport.	Laying Hens	Replacmt Layer Pullets (25%)	94 Broiler Counts	Broiler Proport.	Broilers	94 Turkey Counts	Turkey Proport.	Top 27 Turkey Counties	Derived Proport. Turkey Breeder Flock	Turkey Breeder Hens & 8%Toms
												wks 30-58
			56.21 12.05	24.09 4.2			5.6745 2.0807					82.6 18.88
A-13	103,000	0.008593	105,181	26,295	0	0.000000	0	1,328,400	0.031275	1,328,400	0.033451	18,064
	700,000	0.058400	714,820	178,705	800	0.000024	1,055	146,300	0.003444		0.000000	0
	193,000	0.016102	197,086	49,272	212,000	0.006324	279,542	0	0.000000		0.000000	0
	200	0.000017	204	51	0	0.000000	0	17,500	0.000412		0.000000	0
	300	0.000025	306	77	0	0.000000	0	0	0.000000		0.000000	0
	200	0.000017	204	51	400	0.000012	527	59,300	0.001396		0.000000	0
	500	0.000042	511	128	500	0.000015	659	0	0.000000		0.000000	0
	1,100	0.000092	1,123	281	2,800	0.000084	3,692	0	0.000000		0.000000	0
	800	0.000067	817	204	1,200	0.000036	1,582	0	0.000000		0.000000	0
	40,000	0.003337	40,847	10,212	0	0.000000	0	2,194,000	0.051655	2,194,000	0.055249	29,834
	300	0.000025	306	77	200	0.000006	264	1,069,000	0.025168	1,069,000	0.026919	14,536

TABLE A-3

	BF	BG	BH	BI
	Turkey Replacmnt . Hens & Toms	Turkey Consumer Hens 14#	Turkey Heavy Hens 22#	Turkey Heavy Toms, 36#
	wks 0-30	25%	25%	50%
	70	17.736	35.087	64.717
	16	8.258	16.546	27.165
A-14	33,599	340,119	340,119	680,238
	0	37,458	37,458	74,916
	0	0	0	0
	0	4,481	4,481	8,961
	0	0	0	0
	0	15,183	15,183	30,366
	0	0	0	0
	0	0	0	0
	0	0	0	0
	55,492	561,744	561,744	1,123,489
	27,038	273,703	273,703	547,406

TABLE A-4

1999 Consumption of Corn Equivalents by Livestock Category and County

	County Total Corn Equivalents	Dairy Totals	Cow-Calf Totals	Beef Feeders	Sheep Totals	Swine Totals	Layer Totals	Broiler totals	Turkey Totals
	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels
BECKER	3,521,829	1,426,831	132,593	601,639	8,288	60,002	116,887	0	1,175,590
CLAY	2,106,223	386,433	74,583	613,350	8,288	107,175	794,376	107	121,911
CLEARWATER	1,289,141	237,805	165,741	611,608	11,396	15,244	219,021	28,326	0
KITTSO	590,913	193,217	91,158	143,551	6,216	141,961	227	0	14,583
MAHNOMEN	969,180	312,119	49,722	430,123	1,036	175,839	340	0	0
MARSHALL	892,633	282,394	91,158	445,372	15,540	8,474	227	53	49,414
NORMAN	967,164	312,119	49,722	298,973	1,036	304,679	567	67	0
PENNINGTON	383,418	163,491	58,009	119,482	1,036	39,777	1,248	374	0
POLK	1,486,204	535,062	149,167	726,512	8,288	66,107	908	160	0
RED LAKE	2,579,100	208,079	74,583	275,569	9,324	24,533	45,393	0	1,941,617
ROSEAU	2,354,923	520,199	149,167	670,933	7,252	60,976	340	27	946,030
D10 COMBINED COUNTIES									
D10 NORTHWEST	17,140,726	4,577,749	1,085,604	4,937,111	77,701	1,004,767	1,179,534	29,114	4,249,145

TABLE A-4

1999 Consumption of Corn Equivalents by Livestock Category and County

	County Total Corn Equivalents	Dairy Totals	Cow-Calf Totals	Beef Feeders	Sheep Totals	Swine Totals	Layer Totals	Broiler totals	Turkey Totals
	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels
BELTRAMI	1,090,445	371,571	185,630	519,781	10,360	3,053	0	51	0
CASS	1,455,167	356,708	210,491	716,210	9,324	80,002	936	0	81,496
HUBBARD	906,338	104,040	74,583	235,786	8,288	14,579	874	40	468,147
ITASCA	404,240	59,451	82,871	255,926	3,108	2,711	113	60	0
KOOCHICHING	163,017	29,726	46,407	81,065	3,108	2,711	0	0	0
LAKE OF THE WOODS	147,414	29,726	29,833	81,397	1,036	5,421	0	0	0
D20 COMBINED COUNTIES									
D20 NORTH CENTRAL	4,166,621	951,221	629,816	1,890,165	35,225	108,477	1,924	151	549,644
COOK	1,657	0	1,657	0	0	0	0	0	0
LAKE	15,848	0	1,657	3,865	1,036	9,289	0	0	0
ST. LOUIS	523,179	193,217	62,982	255,969	5,180	5,421	170	241	0
D30 COMBINED COUNTIES									
D30 NORTHEAST	540,685	193,217	66,296	259,834	6,216	14,711	170	241	0

TABLE A-4

1999 Consumption of Corn Equivalents by Livestock Category and County

	County Total Corn Equivalents	Dairy Totals	Cow-Calf Totals	Beef Feeders	Sheep Totals	Swine Totals	Layer Totals	Broiler totals	Turkey Totals
	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels
BIG STONE	1,784,386	178,354	38,120	292,000	4,144	1,127,531	56,741	0	87,496
CHIPPEWA	2,194,442	89,177	26,519	356,365	15,540	1,632,055	0	40	74,746
DOUGLAS	2,589,540	1,634,910	61,324	638,219	12,432	121,371	1,555	3,567	116,161
GRANT	1,247,690	252,668	21,546	223,908	6,216	346,057	397,188	107	0
LAC QUI PARLE	3,257,335	252,668	71,269	557,206	17,612	2,018,053	340,447	80	0
OTTER TAIL	10,329,776	4,533,160	253,584	2,586,025	37,297	388,509	43,123	2,472	2,485,606
POPE	2,445,898	1,114,712	102,759	699,175	13,468	291,374	131,412	2,418	90,579
STEVENS	3,299,514	341,845	43,093	1,462,477	14,504	1,287,726	141,853	8,017	0
SWIFT	3,025,970	356,708	53,037	890,175	3,108	665,179	0	227	1,057,535
TRAVERSE	709,660	14,863	26,519	390,873	6,216	271,190	0	0	0
WILKIN	512,319	148,628	21,546	53,691	1,036	226,616	10,554	0	50,248
YELLOW MEDICINE	5,417,863	356,708	76,241	909,411	18,648	3,758,944	0	120	297,791
D40 COMBINED COUNTIES									
D40 WEST CENTRAL	36,814,393	9,274,400	795,557	9,059,523	150,223	12,134,605	1,122,873	17,049	4,260,163

TABLE A-4

1999 Consumption of Corn Equivalents by Livestock Category and County

	County Total	Dairy Totals	Cow-Calf Totals	Beef Feeders	Sheep Totals	Swine Totals	Layer Totals	Broiler totals	Turkey Totals
	Corn Equivalents								
	Bushels								
BENTON	4,501,990	2,065,932	66,296	489,319	5,180	688,863	384,478	801,921	0
CARVER	3,416,910	2,110,521	21,546	667,027	5,180	560,267	47,492	4,877	0
KANDIYOHI	9,399,011	1,144,437	43,093	959,663	34,995	1,096,280	24,796	361	6,095,386
MCLEOD	3,324,700	1,501,145	34,806	1,251,208	7,252	522,090	4,993	3,207	0
MEEKER	6,746,116	1,278,203	48,065	861,209	19,684	757,225	1,673,863	762	2,107,106
MORRISON	11,397,035	4,161,590	207,176	1,202,114	11,396	307,776	1,002,354	1,501,936	3,002,693
RENVILLE	7,264,181	431,022	21,546	2,074,448	30,851	2,145,435	2,269,645	80	291,154
SCOTT	2,197,339	1,055,260	26,519	790,814	6,216	311,628	6,809	94	0
SHERBURNE	1,759,821	267,531	24,861	409,607	3,108	81,370	514,755	458,588	0
SIBLEY	7,673,053	1,397,105	29,833	1,084,986	24,285	3,794,650	1,243,198	0	98,995
STEARNS	20,938,725	9,318,989	149,167	5,112,740	18,648	679,069	831,484	1,386,106	3,442,521
TODD	7,486,309	3,284,683	164,084	1,235,199	36,427	115,266	199,048	67	2,451,535
WADENA	2,687,891	862,044	77,898	715,337	12,432	5,421	3,972	154	1,010,632
WRIGHT	4,558,760	2,125,383	54,695	1,503,740	11,396	309,560	136,406	15,539	402,040
D50 COMBINED COUNTIES									
D50 CENTRAL	93,351,842	31,003,845	969,585	18,357,413	227,052	11,374,900	8,343,293	4,173,691	18,902,063

TABLE A-4

1999 Consumption of Corn Equivalents by Livestock Category and County

	County Total								
	Corn		Cow-Calf	Beef	Sheep		Layer	Broiler	Turkey
	Equivalents	Dairy Totals	Totals	Feeders	Totals	Swine Totals	Totals	totals	Totals
	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels
AITKIN	953,689	208,079	91,158	288,087	6,216	2,711	0	0	357,438
ANOKA	888,032	74,314	13,259	85,392	2,072	173,165	0	0	539,830
CARLTON	577,766	341,845	58,009	158,011	5,180	5,954	976	40	7,750
CHISAGO	976,057	490,473	44,750	308,330	6,216	105,768	20,427	94	0
CROW WING	968,450	312,119	107,732	356,244	11,396	169,278	3,404	27	8,250
HENNEPIN	964,217	401,296	16,574	339,942	5,180	45,786	11,496	33	143,910
ISANTI	1,024,683	237,805	33,148	206,431	10,360	361,077	2,043	160	173,658
KANABEC	1,351,612	460,747	99,445	629,356	10,360	151,664	0	40	0
MILLE LACS	1,782,238	906,632	54,695	731,115	7,252	51,134	20,427	10,983	0
PINE	2,053,754	1,233,614	124,306	632,091	10,360	16,948	36,314	120	0
RAMSEY	16,520	14,863	1,657	0	0	0	0	0	0
WASHINGTON	521,132	208,079	26,519	179,284	8,288	98,849	113	0	0
D60 COMBINED COUNTIES									
D60 EAST CENTRAL	12,078,152	4,889,868	671,251	3,914,284	82,881	1,182,335	95,200	11,497	1,230,835

TABLE A-4

1999 Consumption of Corn Equivalents by Livestock Category and County

	County Total								
	Corn		Cow-Calf	Beef	Sheep		Layer	Broiler	Turkey
	Equivalents	Dairy Totals	Totals	Feeders	Totals	Swine Totals	Totals	totals	Totals
	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels
COTTONWOOD	4,157,535	222,942	56,352	2,167,392	38,484	903,913	0	141,630	626,822
JACKSON	5,867,867	104,040	44,750	1,102,215	42,689	4,160,179	140,718	0	273,278
LINCOLN	2,539,636	505,336	84,528	1,229,031	75,932	641,487	2,156	0	1,167
LYON	9,404,623	371,571	89,500	3,095,209	38,925	5,479,441	171,358	294	158,326
MURRAY	8,191,067	653,964	71,269	2,722,561	81,462	4,644,062	0	0	17,749
NOBLES	11,448,529	579,650	81,213	3,130,480	40,647	7,407,358	124,717	24,050	60,414
PIPESTONE	3,747,857	832,318	150,824	1,472,093	88,349	1,203,705	567	0	0
REDWOOD	10,027,492	356,708	101,102	1,749,987	25,336	7,663,416	74,331	56,612	0
ROCK	6,368,574	445,885	107,732	2,567,901	26,067	3,207,372	13,618	0	0
D70 COMBINED COUNTIES									
D70 SOUTHWEST	61,753,180	4,072,413	787,270	19,236,867	457,890	35,310,933	527,465	222,587	1,137,755
BLUE EARTH	7,752,430	267,531	23,204	1,121,969	12,432	5,754,821	99,864	214	472,395
BROWN	9,202,784	1,189,026	38,120	1,653,879	19,790	5,373,984	102,247	12,453	813,285
FARIBAULT	2,551,329	341,845	33,148	624,307	19,805	1,526,035	5,901	287	0
FREEBORN	6,165,588	356,708	36,463	624,138	27,773	5,022,950	95,779	1,777	0
LE SUEUR	4,446,529	698,553	33,148	932,723	10,360	2,755,839	340	67	15,499
MARTIN	21,873,157	222,942	33,148	1,497,494	25,336	19,849,471	45,960	481	198,324
NICOLLET	4,323,974	862,044	13,259	704,850	8,288	1,704,871	1,026,220	4,443	0
RICE	10,326,939	1,560,596	33,148	687,089	9,324	5,693,323	3,064	100	2,340,295
STEELE	5,183,763	817,455	18,232	614,832	6,216	3,595,887	28,371	27	102,745
WASECA	7,482,618	535,062	14,917	534,743	23,264	6,351,725	1,192	1,884	19,832
WATONWAN	4,495,344	148,628	13,259	645,753	10,360	3,076,017	262,371	13	338,942
D80 COMBINED COUNTIES									
D80 SOUTH CENTRAL	83,804,455	7,000,389	290,047	9,641,776	172,950	60,704,921	1,671,310	21,746	4,301,318

TABLE A-4

1999 Consumption of Corn Equivalents by Livestock Category and County

	County Total								
	Corn		Cow-Calf	Beef	Sheep		Layer	Broiler	Turkey
	Equivalents	Dairy Totals	Totals	Feeders	Totals	Swine Totals	Totals	totals	Totals
	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels
DAKOTA	3,729,796	683,690	41,435	2,174,119	8,288	640,895	0	294	181,075
DODGE	3,409,515	995,809	28,176	886,806	6,216	997,729	186,111	80	308,588
FILLMORE	10,251,831	2,333,463	273,473	2,520,643	24,864	4,044,378	57,479	174	997,358
GOODHUE	9,160,096	3,790,019	102,759	2,455,021	31,081	2,460,892	155,017	481	164,826
HOUSTON	4,891,049	1,590,322	177,343	1,982,607	10,360	608,091	3,019	1,336	517,971
MOWER	7,777,329	772,867	38,120	1,224,348	28,444	5,549,993	47,663	67	115,828
OLMSTED	4,754,968	1,679,499	149,167	1,725,985	22,792	792,643	3,178	107	381,598
WABASHA	5,406,662	3,091,467	145,852	1,745,850	11,396	206,467	205,630	0	0
WINONA	8,886,297	4,102,139	129,278	2,475,499	15,540	2,013,778	2,383	187	147,493
D90 COMBINED COUNTIES									
D90 SOUTHEAST	58,267,543	19,039,274	1,085,604	17,190,878	158,982	17,314,866	660,478	2,726	2,814,736
STATE TOTAL	367,917,597	81,002,375	6,381,029	84,487,852	1,369,120	139,150,515	13,602,246	4,478,802	37,445,658

TABLE A-5

1999 Consumption of Soybean Meal by Livestock Category and County

	County Total All Livestock	Dairy	Beef Calf	Cow- Feeder	Beef Sheep	Swine	Layer	Broiler	Turkeys
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
BECKER	29,290	13,294	463	355	27	564	689	0	13,897
CLAY	11,294	3,600	261	389	27	852	4,682	1	1,482
CLEARWATER	4,938	2,216	579	425	37	99	1,291	291	0
KITTSO	3,270	1,800	319	98	20	854	1	0	177
MAHNOMEN	4,421	2,908	174	269	3	1,065	2	0	0
MARSHALL	3,978	2,631	319	295	51	79	1	1	601
NORMAN	5,163	2,908	174	186	3	1,887	3	1	0
PENNINGTON	2,073	1,523	203	80	3	252	7	4	0
POLK	6,640	4,985	521	476	27	623	5	2	0
RED LAKE	25,787	1,939	261	184	31	153	268	0	22,952
ROSEAU	17,413	4,847	521	441	24	395	2	0	11,183
D10 COMBINED COUNTIES	0	0	0	0	0	0	0	0	0
D10 NORTHWEST	114,268	42,651	3,794	3,200	255	6,825	6,952	299	50,292

TABLE A-5

1999 Consumption of Soybean Meal by Livestock Category and County

	County Total All Livestock	Dairy	Beef Calf	Cow- Beef Feeders	Sheep	Swine	Layer	Broiler	Turkeys
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
BELTRAMI	4,530	3,462	649	355	34	29	0	1	0
CASS	6,332	3,323	736	494	31	752	6	0	991
HUBBARD	7,099	969	261	164	27	138	5	0	5,534
ITASCA	1,063	554	290	183	10	25	1	1	0
KOOCHICHING	532	277	162	58	10	25	0	0	0
LAKE OF THE WOODS	492	277	104	57	3	50	0	0	0
D20 COMBINED COUNTIES	0	0	0	0	0	0	0	0	0
D20 NORTH CENTRAL	20,048	8,863	2,201	1,311	115	1,020	11	2	6,525
COOK	6	0	6	0	0	0	0	0	0
LAKE	67	0	6	3	3	55	0	0	0
ST. LOUIS	2,261	1,800	220	170	17	50	1	2	0
D30 COMBINED COUNTIES	0	0	0	0	0	0	0	0	0
D30 NORTHEAST	2,333	1,800	232	173	20	105	1	2	0

TABLE A-5

1999 Consumption of Soybean Meal by Livestock Category and County

	County Total All Livestock	Dairy	Beef Calf	Cow- Beef Feeders	Sheep	Swine	Layer	Broiler	Turkeys
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
BIG STONE	10,638	1,662	133	187	14	7,245	334	0	1,064
CHIPPEWA	12,027	831	93	229	51	9,914	0	0	909
DOUGLAS	18,439	15,233	214	347	41	1,146	9	37	1,412
GRANT	7,301	2,354	75	132	20	2,376	2,341	1	0
LAC QUI PARLE	17,913	2,354	249	362	58	12,883	2,007	1	0
OTTER TAIL	77,359	42,236	886	1,455	122	2,997	254	25	29,383
POPE	15,360	10,386	359	413	44	2,257	775	25	1,101
STEVENS	14,819	3,185	151	919	48	9,598	836	82	0
SWIFT	20,826	3,323	185	559	10	4,244	0	2	12,501
TRAVERSE	2,477	138	93	256	20	1,970	0	0	0
WILKIN	3,784	1,385	75	33	3	1,614	62	0	611
YELLOW MEDICINE	31,914	3,323	266	579	61	24,162	0	1	3,520
D40 COMBINED COUNTIES	0	0	0	0	0	0	0	0	0
D40 WEST CENTRAL	232,856	86,411	2,780	5,471	493	80,407	6,618	175	50,501

TABLE A-5

1999 Consumption of Soybean Meal by Livestock Category and County

	County Total All Livestock	Dairy	Beef Calf	Cow- Feeders	Beef	Sheep	Swine	Layer	Broiler	Turkeys
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
BENTON	34,810	19,249	232	263	17	4,551	2,266	8,233	0	
CARVER	24,028	19,664	75	339	17	3,604	280	50	0	
KANDIYOHI	92,022	10,663	151	545	121	8,338	146	4	72,054	
MCLEOD	18,485	13,986	122	703	24	3,588	29	33	0	
MEEKER	52,676	11,909	168	476	65	5,277	9,866	8	24,908	
MORRISON	99,325	38,774	724	669	37	2,297	5,908	15,420	35,495	
RENVILLE	40,811	4,016	75	1,293	107	18,500	13,377	1	3,442	
SCOTT	12,621	9,832	93	439	20	2,196	40	1	0	
SHERBURNE	11,352	2,493	87	250	10	770	3,034	4,708	0	
SIBLEY	46,179	13,017	104	603	85	23,839	7,327	0	1,204	
STEARNS	156,304	86,826	521	2,657	61	6,413	4,901	14,231	40,694	
TODD	63,234	30,604	573	688	128	1,087	1,173	1	28,980	
WADENA	20,789	8,032	272	423	41	50	23	2	11,947	
WRIGHT	28,706	19,802	191	827	37	2,132	804	160	4,753	
D50 COMBINED COUNTIES	0	0	0	0	0	0	0	0	0	
D50 CENTRAL	701,343	288,867	3,388	10,174	770	82,641	49,176	42,851	223,477	

TABLE A-5

1999 Consumption of Soybean Meal by Livestock Category and County

	County Total All Livestock	Dairy	Beef Calf	Cow- Beef Feeders	Sheep	Swine	Layer	Broiler	Turkeys
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
AITKIN	6,723	1,939	319	195	20	25	0	0	4,225
ANOKA	8,210	692	46	54	7	1,029	0	0	6,381
CARLTON	3,648	3,185	203	99	17	44	6	0	94
CHISAGO	5,811	4,570	156	182	20	762	120	1	0
CROW WING	4,729	2,908	376	237	37	1,049	20	0	100
HENNEPIN	6,125	3,739	58	194	17	299	68	0	1,750
ISANTI	6,808	2,216	116	127	34	2,190	12	2	2,111
KANABEC	6,144	4,293	348	403	34	1,066	0	0	0
MILLE LACS	9,688	8,447	191	421	24	371	120	113	0
PINE	12,713	11,494	434	376	34	159	214	1	0
RAMSEY	144	138	6	0	0	0	0	0	0
WASHINGTON	2,760	1,939	93	109	27	591	1	0	0
D60 COMBINED COUNTIES	0	0	0	0	0	0	0	0	0
D60 EAST CENTRAL	73,502	45,559	2,346	2,399	272	7,586	561	118	14,662

TABLE A-5

1999 Consumption of Soybean Meal by Livestock Category and County

	County Total All Livestock	Dairy	Beef Calf	Cow- Feeder	Beef Feeder	Sheep	Swine	Layer	Broiler	Turkeys
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
COTTONWOOD	21,215	2,077	197	1,379	134	8,564	0	1,454	7,410	
JACKSON	34,231	969	156	708	151	28,187	829	0	3,230	
LINCOLN	12,148	4,708	295	775	264	6,078	13	0	14	
LYON	43,846	3,462	313	1,969	140	35,025	1,010	3	1,925	
MURRAY	37,275	6,093	249	1,706	283	28,728	0	0	216	
NOBLES	56,726	5,401	284	1,974	145	47,206	735	247	734	
PIPESTONE	20,953	7,755	527	930	304	11,433	3	0	0	
REDWOOD	54,090	3,323	353	1,121	89	48,183	438	581	0	
ROCK	27,862	4,154	376	1,636	94	21,521	80	0	0	
D70 COMBINED COUNTIES	0	0	0	0	0	0	0	0	0	
D70 SOUTHWEST	308,346	37,943	2,751	12,197	1,604	234,928	3,109	2,285	13,529	
BLUE EARTH	50,331	2,493	81	701	41	40,840	589	2	5,584	
BROWN	59,114	11,078	133	981	70	36,507	603	128	9,614	
FARIBAULT	17,077	3,185	116	384	71	13,283	35	3	0	
FREEBORN	37,558	3,323	127	384	98	33,041	565	18	0	
LE SUEUR	24,728	6,508	116	555	34	17,323	2	1	188	
MARTIN	130,989	2,077	116	946	89	125,074	271	5	2,411	
NICOLLET	30,793	8,032	46	393	27	16,201	6,049	46	0	
RICE	79,788	14,540	116	360	31	37,057	18	1	27,665	
STEELE	31,357	7,616	64	340	20	21,899	167	0	1,249	
WASECA	44,917	4,985	52	308	83	39,222	7	19	241	
WATONWAN	28,152	1,385	46	404	34	20,729	1,546	0	4,007	
D80 COMBINED COUNTIES	0	0	0	0	0	0	0	0	0	
D80 SOUTH CENTRAL	534,803	65,223	1,014	5,756	598	401,178	9,851	223	50,960	

TABLE A-5

1999 Consumption of Soybean Meal by Livestock Category and County

	County Total All Livestock	Dairy	Beef Calf	Cow- Beef Feeders	Sheep	Swine	Layer	Broiler	Turkeys
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
DAKOTA	14,333	6,370	145	1,346	27	4,240	0	3	2,201
DODGE	22,272	9,278	98	504	20	7,625	1,097	1	3,648
FILLMORE	62,469	21,741	956	1,537	82	26,024	339	2	11,790
GOODHUE	56,148	35,312	359	1,334	102	16,118	914	5	2,004
HOUSTON	26,998	14,817	620	1,212	34	4,161	18	14	6,123
MOWER	44,998	7,201	133	737	100	35,138	281	1	1,408
OLMSTED	27,255	15,648	521	1,033	75	5,447	19	1	4,511
WABASHA	33,269	28,804	510	968	37	1,739	1,212	0	0
WINONA	54,145	38,220	452	1,335	51	12,278	14	2	1,793
D90 COMBINED COUNTIES	0	0	0	0	0	0	0	0	0
D90 SOUTHEAST	341,886	177,391	3,794	10,004	528	112,770	3,893	28	33,478
STATE TOTAL SBM (Tons)	2,329,386	754,709	22,300	50,686	4,654	927,458	80,172	45,983	443,424

TABLE A-6

Feed Consumption by MN Livestock & Related Grain Movement Patterns

County	Corn Equiv. Consump.	Corn Equiv. Def./Surplus	Soy Meal Consumed	Total Grain Leaving Co.	Grain Avail. To Exit Co.	Percent Grain Exit Co
	Bushels	Bushels	Tons	Tons	Tons/ Sq. M	%
Becker	3,521,829	-2,438,000	29,290	58,254	96	0.370
Clay	2,106,223	2,593,169	11,294	437,640	482	0.881
Clearwater	1,289,141	-1,080,291	4,938	0	0	0.000
Kittson	590,913	816,527	3,270	306,900	392	0.950
Mahnomen	969,180	-270,131	4,421	72,368	244	0.727
Marshall	892,633	35,982	3,978	223,950	185	0.903
Norman	967,164	1,631,977	5,163	392,438	520	0.936
Pennington	383,418	-125,534	2,073	47,227	97	0.813
Polk	1,486,204	2,503,648	6,640	651,114	396	0.939
Red Lake	2,579,100	-2,040,289	25,787	38,457	120	0.355
Roseau	2,354,923	-2,101,954	17,413	11,951	13	0.162
D10 Northwest	17,140,726	-474,896	114,268	2,240,297		
Beltrami	1,090,445	-1,058,217	4,530	0	0	0.000
Cass	1,455,167	-1,257,967	6,332	0	0	0.000
Hubbard	906,338	471,162	7,099	14,641	72	0.358
Itasca	404,240	-404,240	1,063	45	0	0.045
Koochiching	163,017	-163,017	532	0	0	0.000
Lake of the Woods	147,414	-147,414	492	3,957	22	0.920
D20 North Central	4,166,621	-2,559,693	20,048	18,643		

TABLE A-6

Feed Consumption by MN Livestock & Related Grain Movement Patterns

County	Corn Equiv. Consump.	Corn Equiv. Def./Surplus	Soy Meal Consumed	Total Grain Leaving Co.	Grain Avail. To Exit Co.	Percent Grain Exit Co
	Bushels	Bushels	Tons	Tons	Tons/ Sq. M	%
Cook	1,657	-1,657	6	0	0	0.000
Lake	15,848	-15,848	67	0	0	0.000
St. Louis	523,179	-523,179	2,261	350	1	0.326
D30 Northeast	540,685	-540,685	2,333	350		
Big Stone	1,784,386	7,931,714	10,638	410,988	1,036	0.891
Chippewa	2,194,442	21,327,758	12,027	782,392	1,572	0.927
Douglas	2,589,540	2,407,803	18,439	174,434	417	0.705
Grant	1,247,690	6,874,068	7,301	438,704	1,008	0.926
Lac Qui Parle	3,257,335	18,340,865	17,913	750,222	1,208	0.891
Otter Tail	10,329,776	6,000,996	77,359	414,329	316	0.587
Pope	2,445,898	10,238,102	15,360	419,333	826	0.858
Stevens	3,299,514	15,703,086	14,819	646,895	1,383	0.874
Swift	3,025,970	20,366,630	20,826	774,072	1,276	0.901
Traverse	709,660	12,045,789	2,477	598,518	1,216	0.967
Wilkin	512,319	5,060,704	3,784	543,063	759	0.974
Yellow Medicine	5,417,863	20,511,737	31,914	830,749	1,280	0.845
D40 West Central	36,814,393	146,809,251	232,856	6,783,700		

TABLE A-6

Feed Consumption by MN Livestock & Related Grain Movement Patterns

County	Corn Equiv. Consump.	Corn Equiv. Def./Surplus	Soy Meal Consumed	Total Grain Leaving Co.	Grain Avail. To Exit Co.	Percent Grain Exit Co
	Bushels	Bushels	Tons	Tons	Tons/ Sq. M	%
Benton	4,501,990	2,251,985	34,810	91,491	332	0.419
Carver	3,416,910	5,051,690	24,028	206,636	863	0.683
Kandiyohi	9,399,011	12,373,789	92,022	520,024	879	0.664
McLeod	3,324,700	12,564,800	18,485	495,012	1,266	0.841
Meeker	6,746,116	8,598,214	52,676	396,153	865	0.677
Morrison	11,397,035	-1,905,263	99,325	0	0	0.000
Renville	7,264,181	33,465,419	40,811	1,279,681	1,362	0.863
Scott	2,197,339	3,439,061	12,621	141,287	767	0.696
Sherburne	1,759,821	1,969,779	11,352	68,919	420	0.582
Sibley	7,673,053	12,777,947	46,179	547,176	1,130	0.718
Stearns	20,938,725	-129,352	156,304	144,326	143	0.197
Todd	7,486,309	-2,096,622	63,234	0	0	0.000
Wadena	2,687,891	-998,710	20,789	0	0	0.000
Wright	4,558,760	4,950,010	28,706	235,006	597	0.647
D50 Central	93,351,842	92,312,746	701,343	4,125,711		

TABLE A-6**Feed Consumption by MN Livestock & Related Grain Movement Patterns**

County	Corn Equiv. Consump.	Corn Equiv. Def./Surplus	Soy Meal Consumed	Total Grain Leaving Co.	Grain Avail. To Exit Co.	Percent Grain Exit Co
	Bushels	Bushels	Tons	Tons	Tons/ Sq. M	%
Aitkin	953,689	-933,689	6,723	0	0	0.000
Anoka	888,032	35,968	8,210	7,317	82	0.226
Carlton	577,766	-577,766	3,648	0	0	0.000
Chisago	976,057	1,726,143	5,811	71,739	378	0.720
Crow Wing	968,450	-478,450	4,729	0	0	0.000
Hennepin	964,217	1,358,983	6,125	56,469	523	0.675
Isanti	1,024,683	2,987,317	6,808	115,823	532	0.799
Kanabec	1,351,612	298,088	6,144	17,350	80	0.308
Mille Lacs	1,782,238	552,262	9,688	26,509	126	0.344
Pine	2,053,754	-606,554	12,713	0	0	0.000
Ramsey	16,520	-16,520	144	0	0	0.000
Washington	521,132	2,448,868	2,760	89,874	640	0.858
D60 East Central	12,078,152	6,794,648	73,502	385,080		

TABLE A-6

Feed Consumption by MN Livestock & Related Grain Movement Patterns

County	Corn Equiv. Consump. Bushels	Corn Equiv. Def./Surplus Bushels	Soy Meal Consumed Tons	Total Grain Leaving Co. Tons	Grain Avail. To Exit Co. Tons/ Sq. M	Percent Grain Exit Co %
Cottonwood	4,157,535	22,219,665	21,215	838,600	1,389	0.878
Jackson	5,867,867	20,742,533	34,231	801,676	1,337	0.829
Lincoln	2,539,636	8,660,864	12,148	372,584	884	0.838
Lyon	9,404,623	14,931,377	43,846	645,911	1,026	0.710
Murray	8,191,067	17,109,133	37,275	707,414	1,180	0.755
Nobles	11,448,529	15,893,071	56,726	687,177	1,127	0.681
Pipestone	3,747,857	8,273,700	20,953	366,475	963	0.775
Redwood	10,027,492	27,283,208	54,090	1,076,482	1,356	0.792
Rock	6,368,574	11,960,826	27,862	513,673	1,171	0.741
D70 Southwest	61,753,180	147,074,377	308,346	6,009,992		
Blue Earth	7,752,430	20,115,070	50,331	798,311	1,267	0.786
Brown	9,202,784	13,947,016	59,114	581,377	1,062	0.693
Faribault	2,551,329	26,607,971	17,077	959,346	1,485	0.930
Freeborn	6,165,588	19,231,212	37,558	730,739	1,232	0.809
Le Sueur	4,446,529	8,498,471	24,728	353,510	1,054	0.739
Martin	21,873,157	10,928,843	130,989	545,105	829	0.471
Nicollet	4,323,974	13,634,026	30,793	536,962	1,379	0.816
Rice	10,326,939	2,162,461	79,788	155,813	397	0.350
Steele	5,183,763	9,602,437	31,357	386,372	1,090	0.727
Waseca	7,482,618	10,288,982	44,917	423,381	1,151	0.669
Watonwan	4,495,344	15,194,956	28,152	577,913	1,445	0.821
D80 South Central	83,804,455	150,211,445	534,803	6,048,829		

TABLE A-6

Feed Consumption by MN Livestock & Related Grain Movement Patterns

County	Corn Equiv. Consump.	Corn Equiv. Def./Surplus	Soy Meal Consumed	Total Grain Leaving Co.	Grain Avail. To Exit Co.	Percent Grain Exit Co
	Bushels	Bushels	Tons	Tons	Tons/ Sq. M	%
Dakota	3,729,796	9,483,404	14,333	358,433	1,037	0.774
Dodge	3,409,515	12,697,185	22,272	476,855	1,236	0.833
Fillmore	10,251,831	12,300,391	62,469	487,901	719	0.627
Goodhue	9,160,096	10,730,639	56,148	425,930	709	0.623
Houston	4,891,049	4,629,341	26,998	168,866	362	0.549
Mower	7,777,329	17,892,671	44,998	715,217	1,132	0.766
Olmsted	4,754,968	11,241,032	27,255	413,278	871	0.754
Wabasha	5,406,662	6,440,693	33,269	237,703	600	0.608
Winona	8,886,297	2,862,203	54,145	116,393	257	0.318
D90 Southeast	58,267,543	88,277,558	341,886	3,400,575		
State Totals	367,917,597	627,904,752	2,329,386	29,013,177		

TABLE A-7

**1999 Valuation of County Grain Production,
Consumption, (Imports/Exports)**

COUNTY & DISTRICT	Value of Grain Prod.	Value of Grain Consumed	Value of Net Grain Exports or (Imports)
Test Weight	Dollars	Dollars	Dollars
BECKER	\$17,032,605	\$5,980,043	\$11,052,562
CLAY	\$52,426,425	\$3,551,310	\$48,875,115
CLEARWATER	\$1,354,380	\$2,135,975	(\$781,595)
KITTSO	\$32,783,660	\$897,463	\$31,886,197
MAHNOMEN	\$10,930,750	\$1,611,857	\$9,318,893
MARSHALL	\$26,090,910	\$1,328,677	\$24,762,233
NORMAN	\$45,900,020	\$1,602,169	\$44,297,851
PENNINGTON	\$6,348,560	\$623,799	\$5,724,761
POLK	\$74,743,815	\$2,524,614	\$72,219,201
RED LAKE	\$12,208,530	\$4,049,375	\$8,159,155
ROSEAU	\$7,340,155	\$3,383,597	\$3,956,558
D10 COMBINED COUNTIES	\$358,580	\$0	\$358,580
D10 NORTHWEST	\$287,518,390	\$27,688,877	\$259,829,513
 BELTRAMI	 \$529,100	 \$1,646,612	 (\$1,117,512)
CASS	\$369,800	\$2,610,033	(\$2,240,233)
HUBBARD	\$2,509,090	\$1,589,049	\$920,041
ITASCA	\$56,160	\$53,646	\$2,514
KOOCHICHING	\$19,980	\$30,042	(\$10,062)
LAKE OF THE WOODS	\$422,860	\$19,312	\$403,548
D20 COMBINED COUNTIES	\$208,595	\$0	\$208,595
D20 NORTH CENTRAL	\$4,115,585	\$5,948,693	(\$1,833,108)
 COOK	 \$0	 \$1,073	 (\$1,073)
LAKE	\$0	\$1,073	(\$1,073)
ST. LOUIS	\$60,480	\$40,771	\$19,709
D30 COMBINED COUNTIES	\$40,105	\$0	\$40,105
D30 NORTHEAST	\$100,585	\$42,917	\$57,669

TABLE A-7

COUNTY & DISTRICT Test Weight	Value of Grain Prod. Dollars	Value of Grain Consumed Dollars	Value of Net Grain Exports or (Imports) Dollars
BIG STONE	\$42,441,535	\$3,058,120	\$39,383,415
CHIPPEWA	\$67,704,440	\$3,747,700	\$63,956,740
DOUGLAS	\$22,682,640	\$4,423,586	\$18,259,054
GRANT	\$45,712,300	\$2,127,957	\$43,584,343
LAC QUI PARLE	\$71,644,120	\$5,583,579	\$66,060,541
OTTER TAIL	\$58,334,555	\$17,668,749	\$40,665,806
POPE	\$40,448,670	\$4,224,528	\$36,224,142
STEVENS	\$61,701,095	\$5,637,043	\$56,064,052
SWIFT	\$70,025,225	\$5,178,457	\$64,846,768
TRAVERSE	\$56,341,075	\$1,220,856	\$55,120,219
WILKIN	\$58,751,195	\$868,071	\$57,883,124
YELLOW MEDICINE	\$82,150,090	\$9,259,678	\$72,890,412
D40 COMBINED COUNTIES	\$632,265	\$0	\$632,265
D40 WEST CENTRAL	\$678,569,205	\$62,998,325	\$615,570,880
BENTON	\$15,263,165	\$7,679,893	\$7,583,272
CARVER	\$23,960,195	\$5,822,668	\$18,137,527
KANDIYOHI	\$62,557,875	\$16,006,139	\$46,551,736
MCLEOD	\$48,162,580	\$5,674,495	\$42,488,085
MEEKER	\$49,056,280	\$11,491,836	\$37,564,444
MORRISON	\$19,196,800	\$19,468,443	(\$271,643)
RENVILLE	\$120,951,315	\$12,362,998	\$108,588,317
SCOTT	\$16,253,610	\$3,752,626	\$12,500,984
SHERBURNE	\$8,288,370	\$3,007,775	\$5,280,595
SIBLEY	\$63,172,890	\$13,063,440	\$50,109,450
STEARNS	\$54,249,935	\$35,587,938	\$18,661,997
TODD	\$14,873,820	\$12,750,346	\$2,123,474
WADENA	\$3,423,310	\$4,589,084	(\$1,165,774)
WRIGHT	\$30,326,795	\$7,779,118	\$22,547,677
D50 COMBINED COUNTIES	\$665,510	\$0	\$665,510
D50 CENTRAL	\$530,402,450	\$159,036,799	\$371,365,651

TABLE A-7

COUNTY & DISTRICT	Value of Grain Prod.	Value of Grain Consumed	Value of Net Grain Exports or (Imports)
Test Weight	Dollars	Dollars	Dollars
AITKIN	\$34,000	\$1,680,275	(\$1,646,275)
ANOKA	\$2,405,010	\$1,518,231	\$886,779
CARLTON	\$0	\$37,552	(\$37,552)
CHISAGO	\$8,109,700	\$1,688,258	\$6,421,442
CROW WING	\$926,960	\$1,716,096	(\$789,136)
HENNEPIN	\$6,690,740	\$1,649,891	\$5,040,849
ISANTI	\$11,420,800	\$1,763,411	\$9,657,389
KANABEC	\$4,100,855	\$2,362,105	\$1,738,750
MILLE LACS	\$5,614,660	\$3,065,197	\$2,549,463
PINE	\$3,737,170	\$3,571,834	\$165,336
RAMSEY	\$0	\$1,073	(\$1,073)
WASHINGTON	\$8,200,230	\$903,088	\$7,297,142
D60 COMBINED COUNTIES	\$790,820	\$0	\$790,820
D60 EAST CENTRAL	\$52,030,945	\$19,957,010	\$32,073,935
COTTONWOOD	\$77,767,770	\$7,104,256	\$70,663,514
JACKSON	\$78,816,680	\$10,004,296	\$68,812,384
LINCOLN	\$38,024,775	\$4,372,079	\$33,652,696
LYON	\$75,539,310	\$16,045,722	\$59,493,588
MURRAY	\$77,325,720	\$13,970,884	\$63,354,836
NOBLES	\$83,046,250	\$19,514,980	\$63,531,270
PIPESTONE	\$40,725,385	\$6,455,842	\$34,269,543
REDWOOD	\$110,627,585	\$17,112,103	\$93,515,482
ROCK	\$58,185,720	\$10,896,263	\$47,289,457
D70 COMBINED COUNTIES	\$727,060	\$0	\$727,060
D70 SOUTHWEST	\$640,786,255	\$105,476,425	\$535,309,830
BLUE EARTH	\$83,070,410	\$13,194,089	\$69,876,321
BROWN	\$67,894,420	\$15,669,336	\$52,225,084
FARIBAULT	\$82,134,250	\$4,358,697	\$77,775,553
FREEBORN	\$72,218,580	\$10,505,054	\$61,713,526
LE SUEUR	\$39,336,020	\$7,580,521	\$31,755,499
MARTIN	\$91,908,540	\$37,205,650	\$54,702,890
NICOLLET	\$53,751,855	\$7,359,305	\$46,392,550
RICE	\$35,464,590	\$17,577,172	\$17,887,418
STEELE	\$42,806,630	\$8,824,158	\$33,982,472
WASECA	\$50,678,290	\$12,730,048	\$37,948,242
WATONWAN	\$56,618,905	\$7,650,632	\$48,968,273
D80 COMBINED COUNTIES	\$728,810	\$0	\$728,810
D80 SOUTH CENTRAL	\$676,611,300	\$142,654,662	\$533,956,638

TABLE A-7

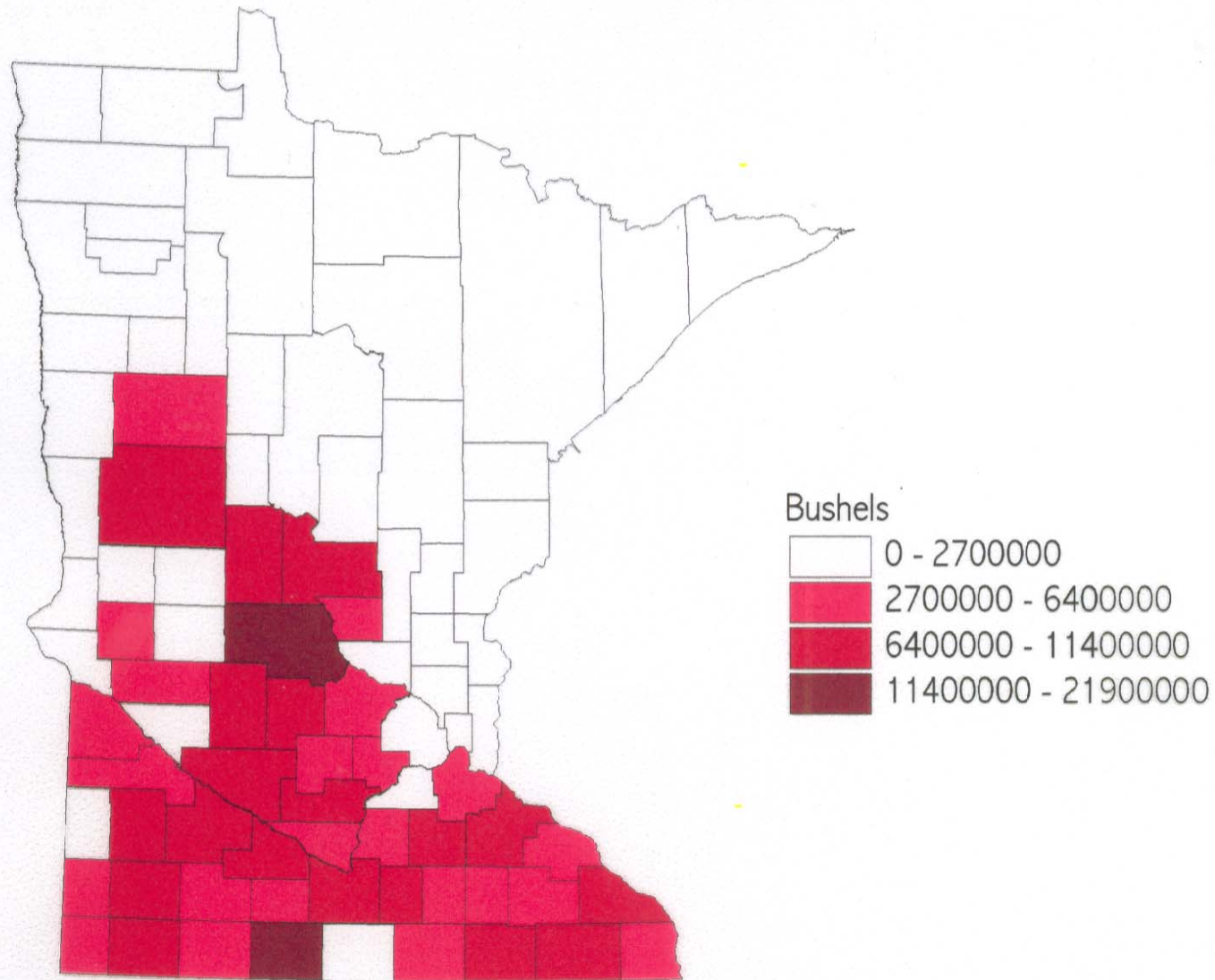
COUNTY & DISTRICT Test Weight	Value of Grain Prod. Dollars	Value of Grain Consumed Dollars	Value of Net Grain Exports or (Imports) Dollars
DAKOTA	\$36,394,105	\$6,367,446	\$30,026,659
DODGE	\$45,647,150	\$5,814,388	\$39,832,762
FILLMORE	\$59,490,540	\$17,588,871	\$41,901,669
GOODHUE	\$52,221,760	\$15,623,510	\$36,598,250
HOUSTON	\$21,970,980	\$8,422,188	\$13,548,792
MOWER	\$75,911,470	\$13,246,074	\$62,665,396
OLMSTED	\$41,810,235	\$8,179,970	\$33,630,265
WABASHA	\$28,227,290	\$9,276,926	\$18,950,364
WINONA	\$24,795,765	\$15,174,572	\$9,621,193
D90 COMBINED COUNTIES	\$378,335	\$0	\$378,335
D90 SOUTHEAST	\$386,847,630	\$99,693,945	\$287,153,685
D98 COMBINED COUNTIES	\$360,405	\$0	\$360,405
D98 COMBINED DISTRICTS	\$360,405	\$0	\$360,405
STATE TOTAL	\$3,257,703,155	\$623,497,653	\$2,634,205,502

APPENDIX B

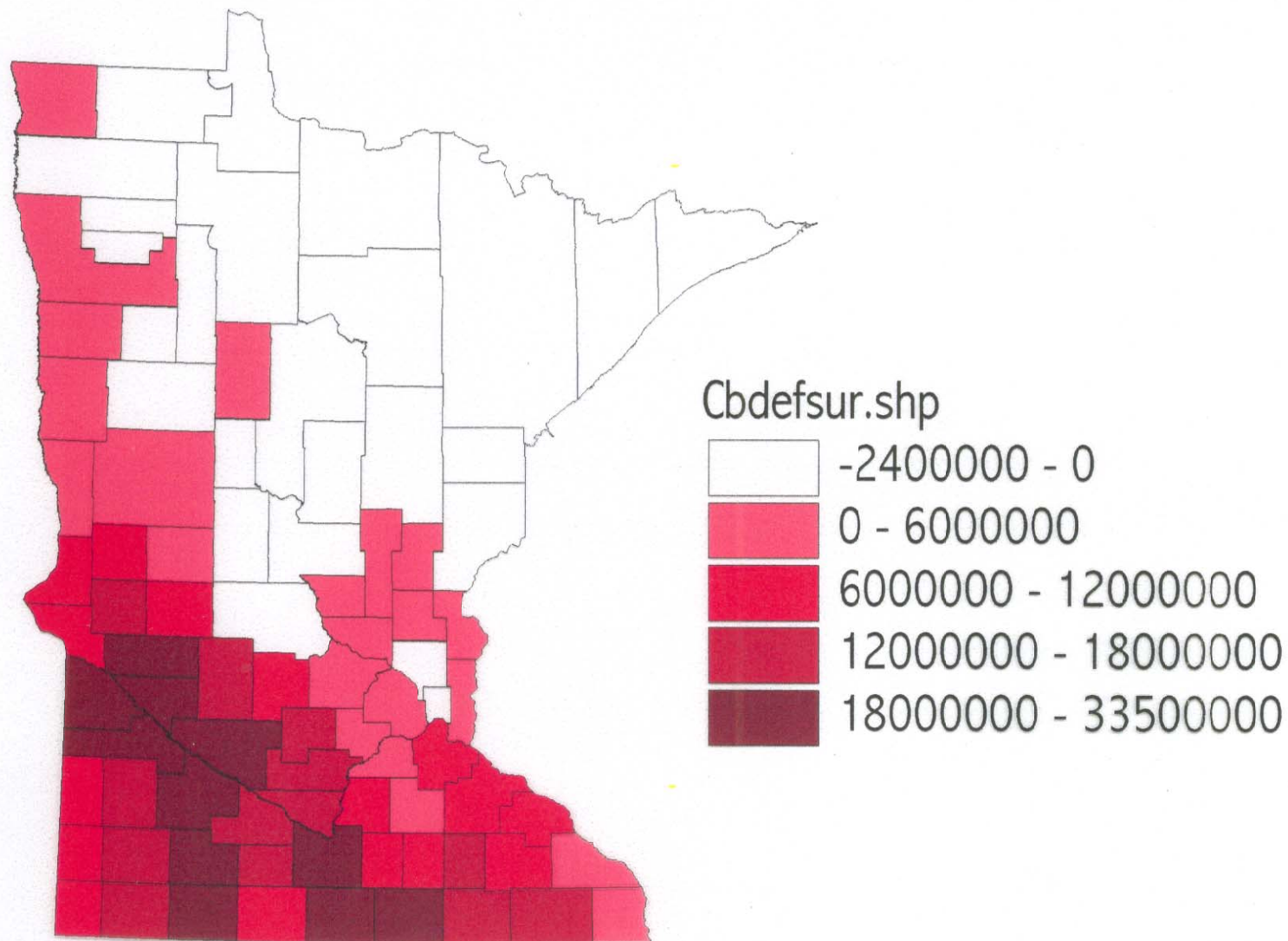
MAPS

Corn and Barley Consumed by Livestock in 1999

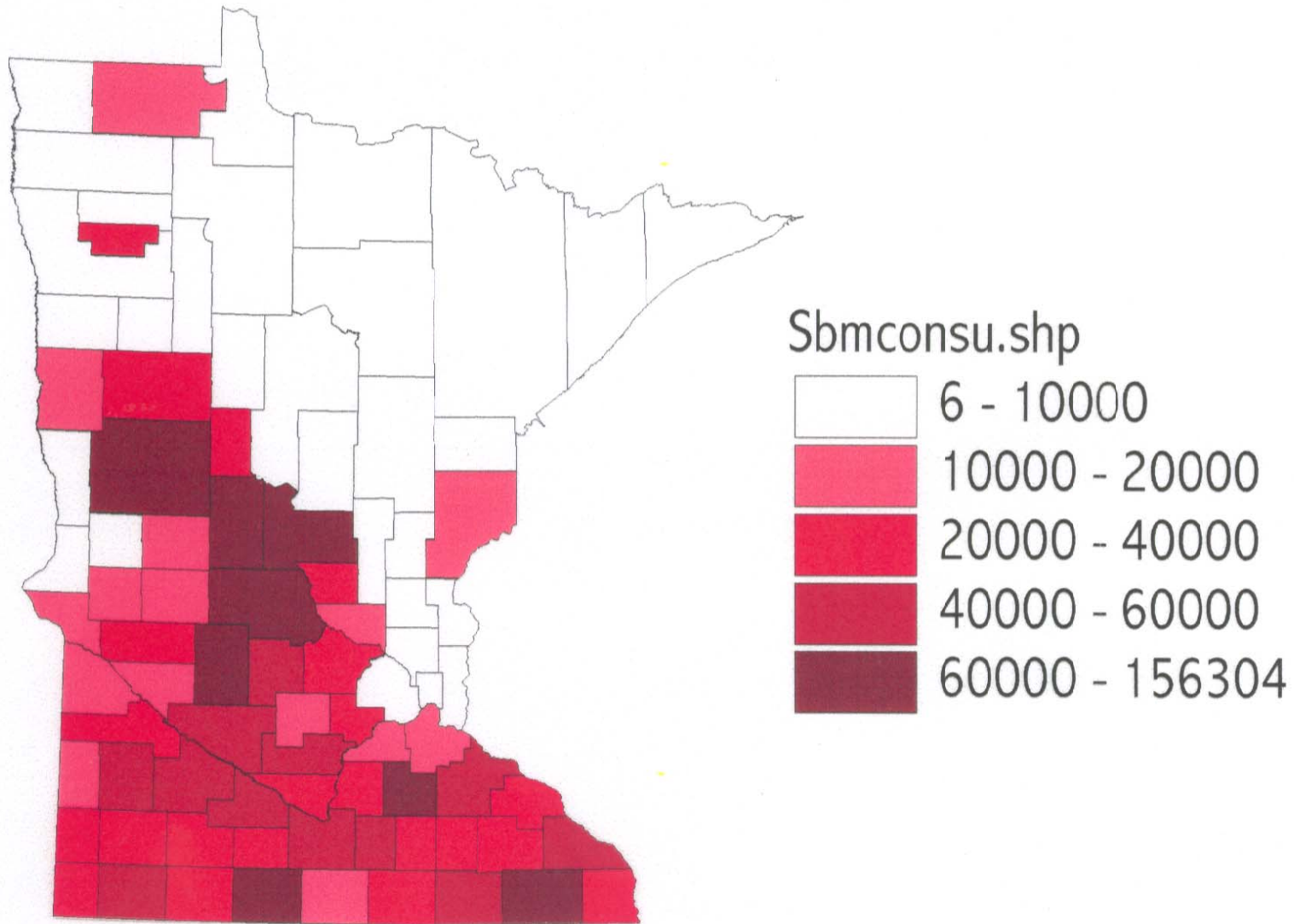
B-1



Corn/Barley Deficit or Surplus (Bushels)

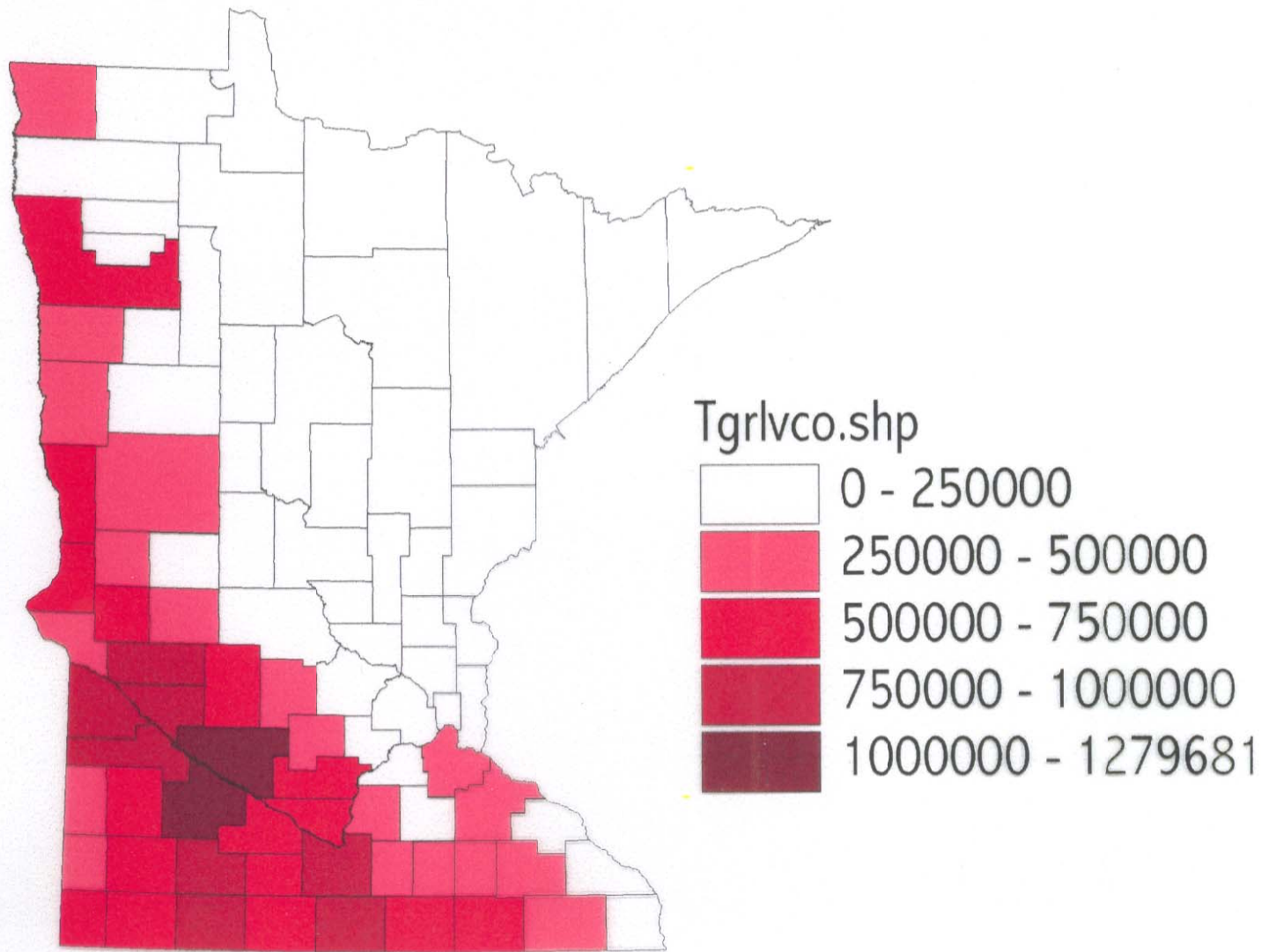


1999 Soybean Meal Consumption (Tons)

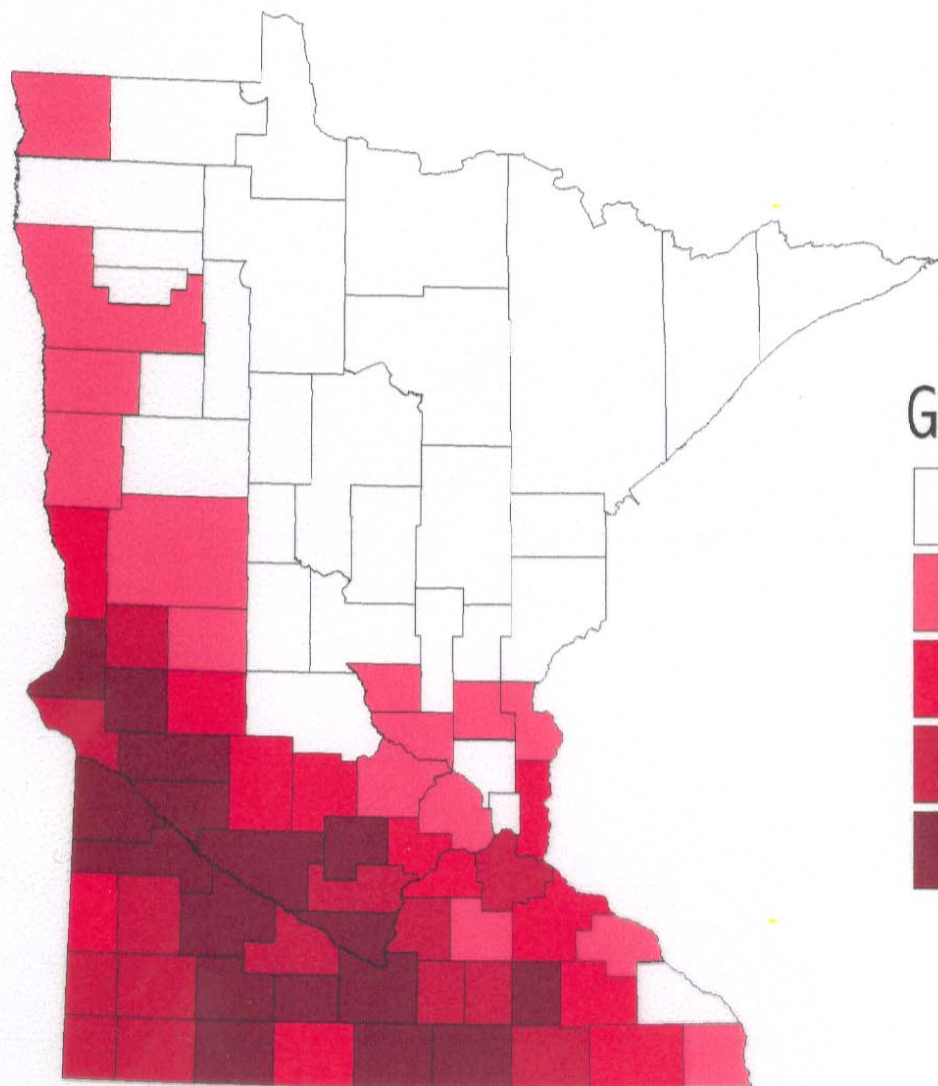


Grain & Oilseeds Available to Leave Counties (Tons)

B-4



1999 Grain & Oilseeds Avail.to Leave County (T./Sq. Mile)



Gravsqm.shp

