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Economic Impact of Moratoria on the Movement of Animals
and Animal Products in the U.S.

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Table of Contents

	Page
Introduction	1
Types of Moratoria	1
Program Costs.	6
Economic Sectors Impacted by Moratoria	7
Economic Impacts on the Production Sector.	8
Economic Impact on Milk Producers	8
Economic Impact on Swine Producers.	10
Economic Impact on Beef Producers	10
Economic Impact on Sheep Producers.	13
Economic Impact on Associated Industries	14
Livestock and Meat Marketing.	14
Milk Assembly and Movement.	22
Associated Industries Supplying Inputs.	25
Economic Impact on Consumption Sector.	25
Economic Impact of a 7-Day Moratorium on the Movement of Livestock and Livestock Products.	27
Economic Impact on 1-State Area (Minnesota)	27
Economic Impact on 6-State Region	29
Economic Impact of a 14-Day Moratorium on the Movement of Livestock and Livestock Products.	30
Economic Impact on 3-County Area.	30
Economic Impact on 1-State Area (Minnesota)	30
Economic Impact on 6-State Region	34
Economic Impact of a 30-Day Moratorium on the Movement of Livestock and Livestock Products.	34
Economic Impact on 3-County Area.	34
Economic Impact on 1-State Area (Minnesota)	37
Summary of Economic Impacts for Alternative Moratoria.	37

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Introduction

In the early stages of an outbreak of an animal disease in the U.S. which has signs similar to a "foreign animal disease," the most effective deterrent to spread of the disease is to stop animal and animal product movement in certain areas. This movement moratorium provides the precious holding time between first suspicion and the laboratory confirmation or denial of the diagnosis of a foreign animal disease. Without this ability to stop animal movement, the disease could easily be spread to several states and be out of control in a few days.^{2/} The duration, geographic size and animal species or products for any feasible moratorium depend importantly on the nature of the disease and the outbreak location. Very likely a movement moratorium would be ordered for a large area and for all livestock and livestock products initially and then reduced to fit the need more precisely, e.g., limit the moratorium to the movement of pigs and pork if it was determined subsequently that the disease was strictly a disease of pigs.

Any action of moratorium on animal movement must be taken swiftly and with full realization that such action can be both costly and disruptive to livestock producers and to selected components of the livestock product processing and distribution system. In most cases, successful avoidance of the economic impacts of a widespread disease outbreak outweighs the adverse financial consequences of the moratoria - especially for a short term, small area moratorium. However, the question of excessive disruption to the livestock production, processing and distribution system will be raised by the various industries affected and by government. Thus, it is important to know the general dimensions of the impact (cost) of this disease-control mechanism as it can be drastic and can bring considerable discomfort to a variety of people.

Types of Moratoria

This study is aimed at providing data and analysis of the economic dimensions of the impact of different kinds of moratoria on the movement of animals and animal products. In preparation for this study we discussed with veterinary staff members of APHIS the most likely types of moratoria that would be imposed. Table 1 shows the physical description of alternative moratoria (thought to be technically feasible) which could be implemented in the control of animal disease. In each of these "moratorium situations" the "adverse effects" are different.

^{1/}This study was done under a Cooperative Agreement between the University of Minnesota and Veterinary Services of APHIS (Animal and Plant Health Inspection Service of the USDA).

The authors acknowledge the assistance of Nasser Aulaqi in the early stages of this study. They also acknowledge the consultation of Dr. Saul Wilson, Jr., and Dr. Gary Combs of Veterinary Services.

^{2/}See Technical Report 9: Animal Movement and Disease Spread: A Pilot Study, by W. Miller and N. Aulaqi, and Technical Report 10: Movement of Milk in the U.S. and Its Implications in the Spread and Control of Foot-and-Mouth Disease, by N. Aulaqi, of the Study of Economic Impact of Foot-and-Mouth Disease in the U.S., USDA Technical Bulletin 1597, 1979.

Table 1
Types of Moratoria on Movement of Animals and Animal Products

	Time					
	7 Days		14 Days		30 Days	
	Live* Animals	Live Animals and Products	Live Animals	Live Animals and Products	Live Animals	Live Animals and Products
Geographical Area Involved	All	All	Swine Only	Pork Only	Swine Only	Pork Only
Three-County Area	No	No	Yes	Yes	Yes	Yes
One-State Area	Yes	Yes	Yes	Yes	Yes	Yes
Regional (Multi-State Area)	Yes	Yes	Yes	Yes	No	No

"Yes" means this moratorium is conceived as being necessary and technically feasible in the control of animal diseases.

*The term "Live Animals" referred to here and elsewhere means cattle, swine, and sheep ONLY.

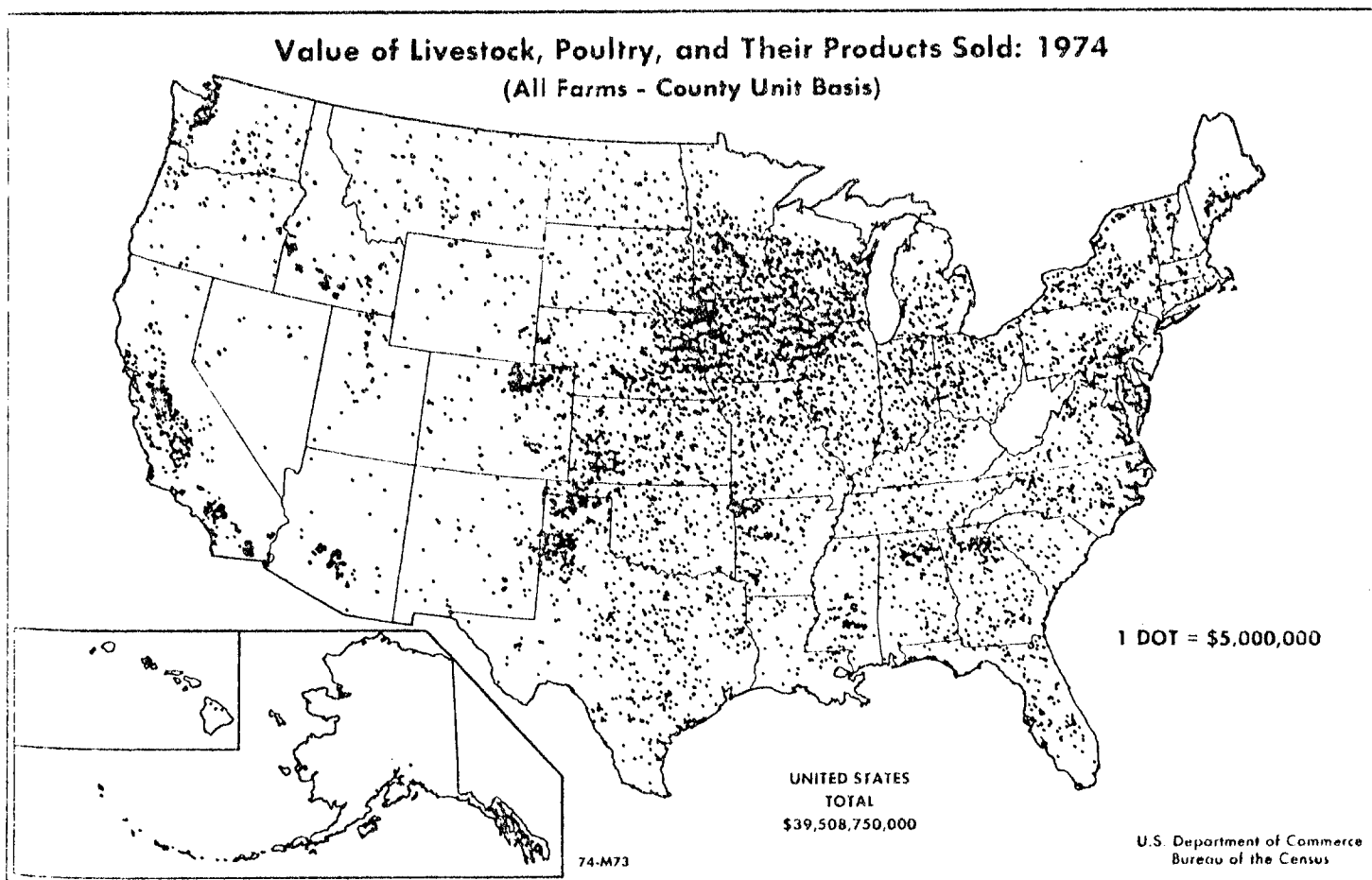
Some perspective on the situations which our study must address can be demonstrated by examples of different disease conditions which would make a moratorium on animal and animal product movements a necessary first step. It seems unlikely that a situation would occur which might require a nationwide moratorium on movement of all livestock and livestock products. Though one might hypothesize such a disease condition, it seems highly unlikely that such a national moratorium could be carried out rapidly and effectively. In this study we provide information on the broad dimensions of the national livestock and livestock products sectors mainly for purposes of background and perspective. It is quite conceivable that a disease outbreak in an area of several states would result in a nationwide "public appeal" announcement asking all producers to refrain from shipping animals to market for a few days or in other types of voluntarily taken precautionary action by producers and by the transportation and processing industries.

A moratorium on animal movement in a region of several states is conceivable both from the standpoint of need and the ability to carry out such action with some adequate degree of effectiveness. If we consider the example of simultaneous outbreaks in neighboring states of a disease in pigs which resembles hog cholera or African Swine Fever, one can see the need for a regional moratorium on movement of pigs and pork products. This would be the most desirable first step to contain the disease until the diagnoses were confirmed and the outbreaks dealt with at the premises on which they occurred. If vesicular lesions were signs of the disease, of course, the moratorium could be extended to cattle and sheep to avoid the possible spread of Foot-and-Mouth Disease should that be the diagnosis. If additional outbreaks did not occur, then the moratorium would likely be reduced to, say, one or two states and, later, to a few counties. For purposes of analysis we have assumed that such a regional moratorium could be carried out for, at most, 14 days.

At the other (lower) end of the geographic size spectrum, a moratorium of only a few counties may be required if the disease is not as threatening or if the outbreaks are only on a few premises which are located relatively near each other. Although this study is principally concerned with moratoria following occurrences of diseases which resemble "foreign animal" diseases, an initial moratorium for a few counties might best fit the occurrence of an outbreak of a disease like anaplasmosis or bluetongue which, while present in the U.S., are not considered endemic in that part of the country. Such a moratorium of a few counties would be a likely follow-up strategy to an initial moratorium of a state or several states because of a suspected foreign animal disease.

For purposes of providing analyses on the impacts of the set of moratoria identified in Table 1, we have identified the regional (multi-state) area as the 6 states of Iowa, Minnesota, Nebraska, North Dakota, South Dakota and Wisconsin. This 6-state region is an important agricultural region nationally (see Figure 1) and one in which a broad combination of livestock and livestock products is produced. Dairy, swine and beef (both cow-calf herds and feedlot operations) are all important in the region and there are numerous sheep enterprises present as well. In addition, the region encompasses a broad range of terminal and auction markets for livestock, several major livestock slaughtering plants and a broad spectrum of dairy plants which handle milk for fluid consumption and/or produce cheese, butter, milk powder and other dairy products.

Figure 1

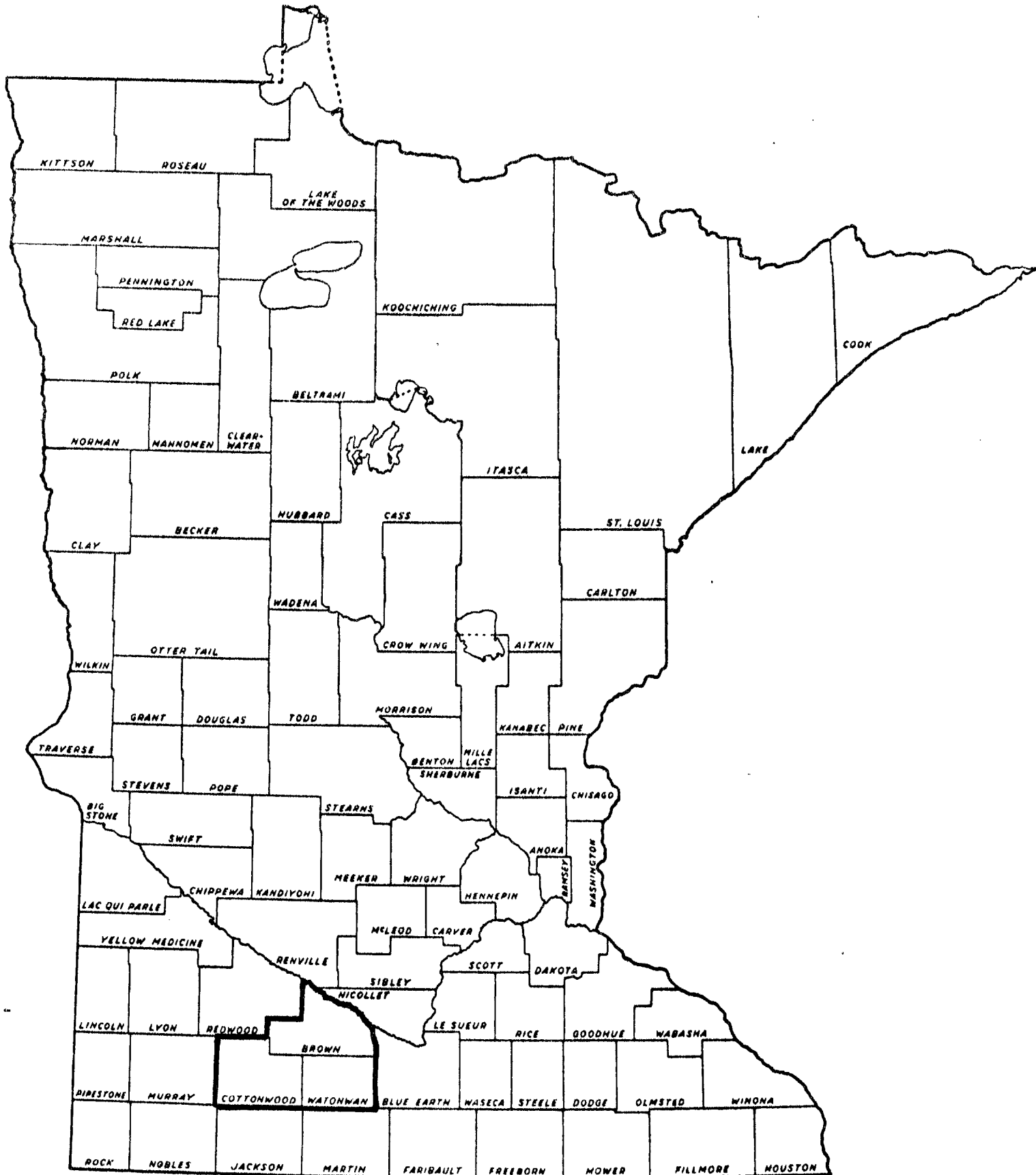


Source: U.S. Census of Agriculture, 1974

Minnesota is the 1-state area selected for intensive study of moratoria impacts on a single state and, within Minnesota, the 3-county area including Brown, Cottonwood and Watonwan counties (Figure 2) was selected as the substate area for intensive impact analysis. This 3-county area is one producing a broad representation of economically important livestock and livestock products and, as is typical for most 3-county areas, it has no terminal livestock markets.

In this study it is assumed that the moratorium is absolute for the period under analysis. This we know is simplistic because it would take some three to five days to achieve the complete moratorium desired and further it is realized that the degree of thoroughness could easily be compromised by lack of personnel and poor cooperation from producers and the transportation and processing industries. But, to incorporate these subjective complexities in our appraisal is difficult if not impossible.

Figure 2. State of Minnesota Showing the Three-County Livestock Moratorium Study Area of Brown, Cottonwood and Watonwan Counties



The execution of a moratorium requires considerable enforcement effort. This effort would in most cases be the responsibility of law enforcement agencies such as the state highway patrol and sheriff's department. The entire moratorium would be supervised by APHIS personnel. An intensive disease surveillance activity would consist mainly of diagnosis, investigations of suspicious outbreaks and guarantees and decontamination of infected premises.

Program Costs

In addition to the economic impacts of the moratoria on several key business sectors, significant program costs would be incurred to maintain the moratoria. These costs are hard to estimate because they would be made up of the additional costs the enforcing agencies (state police, sheriff offices, APHIS and others) would incur. In most cases these costs would be relatively low and consist of additional per diem and travel expenses to operate the inspection posts necessary to maintain the moratorium. There would also be program costs to APHIS for disease investigation and to deal with "infected" or "suspected to be infected" premises. Keep in mind that a short-term moratorium is a "first step" strategy in disease control which may be followed by more costly eradication or control efforts.

Some perspective on moratoria program costs is offered by the following estimated and actual costs:

- 1) In the "Study of the Potential Economic Impact of Foot-and-Mouth Disease in the U.S."^{3/} the estimates of the costs to quarantine the 6-state region (Minnesota, Wisconsin, Iowa, North Dakota, South Dakota and Nebraska) for one year was about \$3.8 million and for the state of Minnesota alone was almost \$2.6 million. These estimates were based on a program of personnel and equipment employed specifically for implementing the area quarantine. A short-term moratorium using mainly emergency forces would cost considerably less than these quarantine costs scaled down to the shorter time periods (\$142 thousand for two weeks for six states, and \$98 thousand for two weeks for Minnesota).
- 2) In 1976 hog cholera was successfully eradicated from outbreaks in New Jersey, Massachusetts and Rhode Island. This effort took some four months and cost some \$2.2 million in program costs alone. The major components of this program cost were for depopulation and disease investigation. So again, estimates of additional costs to APHIS for the disease investigation component of a moratorium would be much lower than this \$2.2 million total.
- 3) In December 1978 continuing to January 1979, APHIS conducted an exercise in five regions (designed to cover the entire U.S.) to test their ability to respond to a simulated threat of Foot-and-Mouth Disease outbreaks. The costs for this exercise were principally for disease investigation on premises and to trace animals and animal products from premises or areas of the disease outbreaks. This exercise cost about

^{3/} E. Hunt McCauley, et al, A Study of the Potential Economic Impact of Foot-and-Mouth Disease in the United States, Technical Bulletin 1597, U.S. Government Printing Office, May 1979. See particularly Technical Report No. 3.

\$175 thousand, of which 75 percent was for regular salaries and benefits, and the remainder was mostly for travel and per diem. "Investigation" costs would likely be increased significantly from this level, however, under conditions of actual disease outbreak.

The manpower required to maintain a moratorium has been estimated in general terms by APHIS officials as follows: It requires about four state police for every APHIS livestock inspector involved in the moratorium part of an emergency program against a disease outbreak. During a hog cholera outbreak in Missouri some 100 livestock inspectors were involved in all phases with 50 percent charged with enforcement of movement moratoria. Using this experience then, it would seem that for a moratorium on the state of Minnesota some 100 livestock inspectors and 400 state police could be required to maintain a moratorium similar to that in Missouri. In Missouri out-of-state movement was controlled essentially by enforcement at the markets. Movements of pigs into Missouri from states to the south was also stopped. Another movement control was achieved by the banning in surrounding states of the in-shipment of pigs from Missouri.

The above perspective suggests that though the direct program costs of a moratorium can be substantial, they are not prohibitive. And, the technical requirements of such moratoria are well understood and documented. The estimates of economic impacts for moratoria which follow do not include these program costs.

Economic Sectors Impacted by Moratoria

Though the direct program costs of moratoria on the movement of selected livestock and livestock products are not prohibitive, a much greater economic impact is expected to occur for the several functional sectors affected by such moratoria. These sectors are complex and composed of firms of heterogeneous size and structure. Some firms have important economic linkages to the livestock and livestock products industry, others have only minor linkages. Similarly, some consumers rely heavily on the consumption of livestock products, others hardly at all. For purposes of simplicity and manageability, we have grouped the affected functional sectors into three categories:

- 1) The production sector (mainly farmers, ranchers and feedlot firms).
- 2) Associated industries - including mainly those involved in the marketing, transportation, wholesaling and retailing of livestock and livestock products and in supplying the production sector with its inputs.
- 3) Consumption sector - made up of individuals who consume livestock products via household purchases and preparation, institutional feeding programs and food services and commercial "away-from-home" eating establishments.

The nature of economic impact of specific moratoria on each of the above economic sectors (particularly the first two) ranges from that of (1) a "temporary, nuisance-type disruption" which is, in the main, recovered after the temporary disruption to (2) major disruptions which may inflict permanent (non-recoverable) economic losses to those affected. In the sections of this report which follow we treat separately the economic impact of moratoria on each of the three economic sectors listed above and then we aggregate these three types of "non-recoverable" economic impacts in a final section.

Economic Impacts on the Production Sector

Economic impacts of a moratorium on the movement of livestock and livestock products vary widely depending mainly on (1) product perishability, (2) whether or not the livestock involved are used mainly for breeding purposes or sold for consumption purposes and (3) the stage of the livestock enterprise production cycle at which the moratorium is imposed. For example, milk is the most perishable livestock product involved, followed by hogs and cattle in the final stages of finishing for market, during which time a high ratio of fat relative to protein tissue is being produced in animals and when weight gain-feed conversion ratios are turning strongly downward. At the other end of the impact spectrum, a moratorium of short or moderate duration will generally have little economic impact on breeding animal enterprises and/or on animals in the early stages of their growth cycle.

Economic losses from a moratorium on the movement of livestock and livestock products thus occur to producers mainly in two forms:

- 1) Some perishable products (primarily milk) must be dumped or diverted to a lower value use such as livestock feed if such an alternative is available and
- 2) Additional production costs (mainly feed) and/or price discounts (mainly for excess weight and/or fat) are incurred by producers who are forced because of the moratorium to delay marketing of finished animals.

In order to estimate the extent of losses accruing to the production sector from specific types of moratoria we first estimate the actual average value of production for the 1975-77 period and then evaluate possible losses of the two types listed above.

Table 2 reports the average weekly value of livestock sold for slaughter and of milk sold off-the-farm during the above mentioned period (1975-77). The value of weekly production of livestock and milk totals \$639 million nationally, \$199 million for the 6-state study region, \$36 million for the state of Minnesota and over \$1.5 million for the 3-county area. Thus, the "disruption" impact of an effective moratorium on the movement of all livestock and milk, even for a week, is a major one.

Economic Impact on Milk Producers

Milk is the most perishable of major farm-produced livestock products. A high proportion of farms has limited on-farm uses for milk and is generally ill-equipped to do anything except market their milk conventionally or dump the milk on fields. A few, however, can divert some milk to a hog enterprise but at a much lower use value. If, in fact, the transport of milk from farms to assembly and processing points must be discontinued during the time of a moratorium, an estimated 60 percent^{4/} of the value of production during the first week of the

^{4/}This projects a very high loss rate for production after two to three days when on-farm storage facilities are full and milk quality cannot be maintained.

Table 2

Average Weekly Value of Farm-Level Livestock
and Livestock Product Sales (1975-77)*

	U.S.	6-State Region	Minnesota	3-County Area
----- 1,000 lbs -----				
<u>Meat Production (Live weight)</u>				
Cattle slaughter	814,258	271,628	30,889	**
Calf slaughter	27,407	2,770	51	**
Hog and pig slaughter	335,601	140,286	21,901	**
Sheep and lamb slaughter	14,325	2,343	495	**
----- 1,000 dollars -----				
<u>Value of Production</u>				
Beef	260,538	70,100	8,803	300
Hog and pig	148,905	65,051	9,956	621
Sheep and lambs	6,014	1,140	166	5.5
<u>Dairy Production</u>				
Milk (million lbs)	2,298	717	177	3.7
Milkfat (thousand lbs)	84,192	26,403	6,404	134
Total Value of Milk Production (\$1,000)	223,453	62,355	17,100	584

* Values reported are averages for 52 weeks and represent production of livestock for slaughter and milk for sale off-the-farm.

** No reliable estimates are available which identify the origin of slaughter animals as this 3-county area.

moratorium and almost all (90 percent plus) of the value of production after the first week will be lost to producers with no compensating returns except indemnity payments, if the latter are paid. Such payments will, of course, increase program costs by the amount of payments plus administrative costs. Because of this extremely high economic loss rate for milk due to its perishability there will be strong pressures and high economic incentives for removing the moratorium on milk movement and/or implementing special product treatment programs to reduce disease transmission hazards.

A sometimes discussed moratorium alternative is the one of permitting the shipment of fluid milk for human use and for manufactured dairy products but prohibiting the use of milk or dairy manufacturing by-products in animal feeds or feed supplements, thus avoiding this source of possible disease transmission to livestock.

Economic Impact on Swine Producers

A major portion of the losses to hog producers from a moratorium on the movement of swine will result from additional feed costs and from market price discounts for subsequent sale of overweight (and overfat) hogs. For simplicity we have estimated that a feed-weight gain ratio of 3.65 (ratio of feed required per pound of gain) obtains for weight gains from the 12th week after birth to the 24th week (as hogs grow from 74 pounds to 212 pounds). This ratio increases to 4.50 as hogs are fed from the 24th week to the 30th week.^{5/} This economic loss of about \$.40 per hog affected, per week is compounded by an estimated price discount of \$.70 per hundredweight in the market price of barrows and gilts in weight classes over 240 pounds.^{6/} We estimate that roughly 1.9 percent of the annual marketings of hogs (shown in Table 3) will move into these heavier weight classes during each week a moratorium is in effect. Though this percentage will vary somewhat by season (month), we have not attempted to refine our economic impact analysis to a seasonal basis. Minor costs to hog producers will also result from moratoria on movement of breeding animals. These occur in the form of disruption of planned facility use and, if the moratorium is a widespread one, in additional declines in market prices as hogs are marketed in large volume upon lifting of the moratorium. In addition, a select, but reasonably small, number of feeder pig producers will be forced to keep pigs to heavier weights. Should the moratorium be an extended one (more than 14 days) they will also be forced to adjust their schedule of operations somewhat. We believe, however, that the major economic impacts of swine producers are captured in the feed inefficiencies (additional feed requirements) and price discounts identified above.

Economic Impact on Beef Producers

The make-up of beef cattle population is a much more complex one than for hogs because of the large number of breeding herd replacements in the calf and heifer categories and because of the wide range of programs for growing and

^{5/} Adaptation of unpublished data and analysis by J. Hassler and associates at the University of Nebraska.

^{6/} This estimate is based on market price data from 1975-77 centering on the St. Paul, Minnesota and Omaha, Nebraska terminal markets.

Table 3

Hog Marketing - Minnesota, 6-State Region
and U.S. (1975-77)

	1975	1976	1977	1975-77 Annual Ave.	Weekly Average
	- - - - - 1,000 head - - - - -				Head
Minnesota	5,067	4,981	5,954	5,334	102,577
Iowa	16,871	18,331	20,639	18,614	357,962
Nebraska	4,411	4,576	5,021	4,669	89,789
North Dakota	465	508	438	470	9,039
South Dakota	2,558	2,523	2,655	2,579	49,596
Wisconsin	2,360	2,364	2,492	2,405	46,250
6-State Region	31,732	33,284	37,199	34,072	655,231
U.S.	73,595	75,744	81,962	77,100	1,482,692

Source: Crop Reporting Board, ESCS, U.S. Department of Agriculture

feeding out (finishing) cattle.^{7/} In addition, there continues to be a good deal of seasonable variability in cattle production and feeding. Thus, the economic impact of a moratorium will vary at different times of the year. Despite these complexities, it is our judgement that the major economic losses to beef producers from a moratorium will occur as the result of delayed marketings of those cattle on feed which are already in the heavier weight classes and ready for market when the moratorium is implemented. Table 4 shows that fed cattle marketings are substantial for the study area states, particularly for Iowa and Nebraska. Table 5 shows the corresponding number of cattle on feed by weight and sex classes. It is from this distribution of cattle on feed that we derive our subsequent estimates of economic impacts on cattle feeders of alternative moratoria on livestock movements.

Noticeable increases in feed requirements per pound of gain for cattle on feed generally occur for steers in weight classes over 1,050 pounds and for heifers in weight classes over about 950 pounds.^{8/} Price discounts become significant only as steers exceed the 1,250 pound weight range and heifers the 1,075-1,100 pound weight range.^{9/}

^{7/} Cattle feeding programs vary, for example, by sex, age, weight and quality grades of cattle and by time on feed and ration fed.

^{8/} These judgements are drawn from a broad range of data including unpublished data from Hassler and associates at the University of Nebraska.

^{9/} This conclusion is based on market price data from 1975-77 centering on the St. Paul, Minnesota and Omaha, Nebraska terminal markets.

Table 4

Fed Cattle Marketed from Feedlots -
Minnesota, 6-State Region and 23-State Total,
1975-77*

	1975	1976	1977	1975-77 Annual Ave.	Weekly Average
	- - - - - 1,000 head - - - - -				Head
Minnesota	762	804	758	775	14,904
Iowa	2,645	2,905	2,862	2,804	53,923
Nebraska	2,795	3,458	3,785	3,346	64,346
North Dakota	67	71	63	670	12,885
South Dakota	561	579	572	571	10,981
Wisconsin	186	182	179	182	3,500
6-State Region	7,016	7,999	8,219	8,348	160,538
23 States**	20,500	24,170	24,861	23,177	445,712

* Source: Livestock and Meat Statistics (Annual Supplements), U.S. Department of Agriculture

** 23-State total includes all major cattle feeding states and about 95 percent of fed cattle.

Table 5

Cattle on Feed by Weight and Sex Classes,
Average 1975-77*

Weight and Sex Classes	U.S.**	6-State Region	Minnesota	3-County***
	- - - - - 1,000 head - - - - -			Head
Steers < 500 lbs	388	87	15	1,238
Steers 500-699 lbs	1,400	388	47	3,715
Steers 700-899 lbs	2,347	706	70	5,523
Steers 900-1,099 lbs	2,070	687	67	5,307
Steers 1,100 lbs & over	501	186	18	1,474
Heifers < 500 lbs	336	91	14	1,100
Heifers 500-699 lbs	891	391	42	3,282
Heifers 700-899 lbs	1,007	410	45	3,518
Heifers 900 lbs & over	367	190	14	1,140

* Inventory average of January 1, April 1, July 1, October 1.

** Data collected on 23 major cattle feeding states representing about 95 percent of cattle on feed.

*** Estimated on the basis of state percentages

In summary, we have estimated significant declines in feeding efficiency for those fed cattle which are retained on feed an additional 30 days beyond optimal marketing weights and which as a result weigh an additional 75 pounds or more. Though the latter situation results in a significant cost increase due to feed efficiency loss, no significant price discount occurs. The effective producer loss is estimated at \$9.00 per head at 1975-77 prices. Economic losses resulting from holding marketable cattle for another week or so will be minimum, perhaps \$2 per head at most.

Economic Impact on Sheep Producers

Compared to dairy, hogs and beef cattle, the sheep industry is a minor one in the area for which the economic impacts of moratoria on livestock movements are assessed. Yet, because of the intermixing of sheep and lambs with other livestock and because of their susceptibility in common with cattle and hogs to some diseases, particularly FMD, they become an important consideration in any effective moratorium.

Table 6 shows an inventory of the sheep and lamb population for the study area (1975-77 average) and of the number of animals slaughtered, slaughter liveweight and value of production.

Table 6
Inventory, Slaughter and Production Value of Sheep and Lambs
(1975-77 Average)

Sheep and Lambs (January)	U.S.	6-State Region	Minnesota	3-County Area
	- - - - 1,000 head - - - -			Head*
Stock sheep and lambs	11,614	1,683	252	8,267
Sheep and lambs on feed	1,909	380	75	2,460
Ewe, wether and ram lambs	1,795	243	32	1,258
Stock sheep 1 year & older	7,910	1,056	145	4,749
<u>Sheep and Lambs</u>				
Commercial slaughter	6,834	1,126	230	**
Commercial slaughter liveweight	744,910	121,860	25,753	**
- - - - -				
Value of production for sheep and lambs (\$1,000)	312,778	59,310	8,650	284

* Estimates based on Minnesota's distribution.

** No reliable estimates are available which identify the origin of slaughter animals as this 3-county area.

On the basis of the relatively small number of sheep and lambs in the study area and the correspondingly low number on feed, we estimate the economic impact to producers in the study area of a moratorium on movement of sheep and lambs to be relatively insignificant. This would not be true, however, if moratoria were implemented in some areas of the U.S. during the time when sheep must be moved by truck or via trailing to summer pastures or to winter facilities for feed and shelter.

Economic Impact on Associated Industries

The major economic impacts of a moratorium on industries associated with the livestock sector will occur in the form of decreased business (income) for the industries involved, decreased wages for workers employed in these industries and increased per unit costs for the lower volume of livestock and livestock products actually handled. Perhaps the most difficult dimension of evaluating the economic impact of moratoria on these associated industries is that of estimating what portion of the economic losses will be recovered after the moratoria are terminated and what portion are permanent (non-recoverable) losses.

We use the term "associated industries" to include all of the activities involved in servicing the livestock production, marketing and processing sectors with inputs and in moving livestock and livestock products to their final outlets. Major activities include the following:

- A) Transportation of livestock, meat products and milk
- B) Operation of central, auction and direct livestock markets
- C) Operation of meat packing, processing, wholesaling and retailing establishments
- D) Assembly, processing and distribution of milk and dairy products
- E) Supplying inputs to producers and to the above mentioned "associated industries."

An upper bound to the total volume of economic activity nationally of those industries associated with the livestock and dairy sectors can be obtained from the aggregate "marketing bill" for these sectors shown in Table 7.

This aggregate marketing bill is the difference between consumer expenditures and farm values. On an annual basis it totaled almost \$29.5 billion in 1976 for meat and over \$14.5 billion for dairy products. With this broadly defined "upper bound" in mind for "value added" in the marketing process, we next proceed to break out major components of the associated industries involved along functional and geographical lines.

Livestock and Meat Marketing

Figure 3 depicts the complex livestock marketing system in the U.S. The actual operating system is, however, even more complex than this diagram indicates because it includes a major transfer infrastructure servicing the breeding component of the livestock industry.

Table 7

Consumer Expenditures, Marketing Bill and Farm Value for Meat and Dairy Products, 1976

Item	Meat	Dairy Products
	- - \$ million - - -	
Consumer expenditures	50,902	25,693
Marketing bill	29,596	14,552
Farm value	21,306	11,141

Source: Adapted from Agricultural Outlook, U.S. Department of Agriculture, ERS, October 1977.

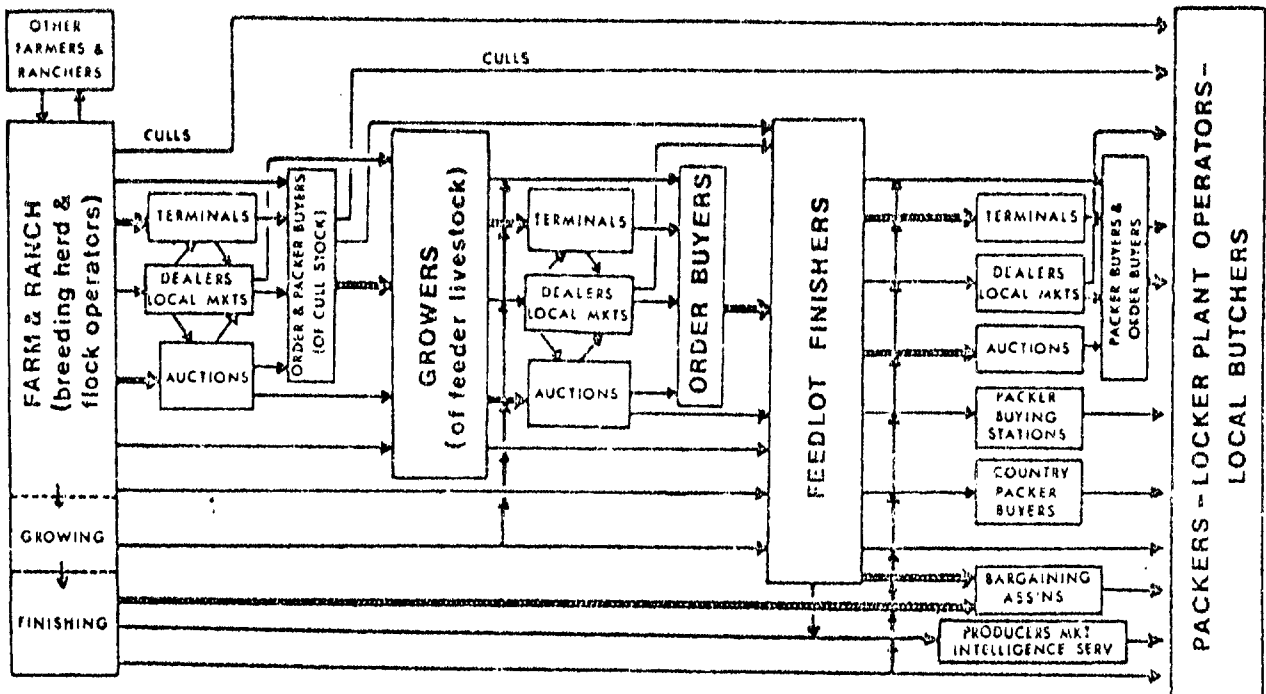


Figure 3. SCHEMATIC DIAGRAM OF LIVESTOCK MARKET CHANNELS
Wide arrows are channels in which professional marketing assistance is used by livestock producers.

Source: John McCoy, Livestock and Meat Marketing, 1972.

A moratorium on movement of livestock and livestock products would impact heavily on the meat packing industry and the transportation system servicing this industry via shipment of live and dressed animals. A large proportion of federally inspected livestock slaughter plants in the U.S. is located in the moratoria study area. This is particularly true for Iowa, the eastern portions of Nebraska and South Dakota and the southern portions of Minnesota and Wisconsin. Using standardized liveweight and dressed weight transportation charges for a standardized distance to and from slaughter plants results in total estimated annual transportation payments nationally of almost \$800 million for cattle, hogs and sheep. Corresponding totals for the 6-state region and Minnesota are \$283 million and \$36.8 million respectively (Table 8).

Transportation payments in Table 8 do not include shipment of feeder cattle, feeder hogs and feeder lambs, nor do they include transportation of animals used for breeding herd purposes. These will add to a sizeable total, perhaps 30 percent of the costs of moving live animals to slaughter.

Table 9 presents the purchase volume, by packers of livestock through auction and terminal markets (1975-77 average) and shows the estimated annual volume of business represented by commission and fee payments alone: \$71.6 million for the U.S., \$25 million for the 6-state region and \$3.1 million for Minnesota.

Table 10 documents the number of federally inspected meat packing plants, employee numbers and average weekly earnings. Table 11 shows the total liveweight volume of animal slaughter and the total sales value of finished products from slaughter. With annual sales value of over \$37 billion nationally, \$13 billion for the 6-state region and \$1.6 billion plus for Minnesota alone, the "livestock for slaughter" industry is a very major one.

The above mentioned data have been summarized in Table 12 to serve as a partial basis for our subsequent estimates of the economic impacts of 7, 14 and 30-day moratoria on movement of livestock and livestock products.

Table 8

Estimated Annual Transportation Volume and Costs To and From
Slaughter Plants, 1975-77 Average

	Total Live and Dressed Weights*	Total Transportation Cost**
<u>U.S.</u>	1,000 lbs.	\$ million
Cattle slaughter	42,341,430	69.863
Calf slaughter	1,425,173	2.351
Dressed beef	26,188,704	460.092
Hog slaughter	17,451,263	28.795
Dressed hogs	13,088,447	230.035
Sheep and lamb slaughter	744,910	1.229
Dressed sheep and lamb	372,455	6.555
Total transportation payments, U.S.	NA	798.920
<u>6-State Region</u>		
Cattle slaughter	14,124,690	23.305
Calf slaughter	144,055	.237
Dressed beef	8,544,041	150.037
Hog slaughter	7,294,878	12.036
Dressed hogs	5,471,158	96.292
Sheep and lamb slaughter	121,860	.201
Dressed sheep and lamb	60,930	1.072
Total transportation payments, 6-state region	NA	283.180
<u>Minnesota</u>		
Cattle slaughter	1,606,244	2.650
Calf slaughter	2,631	.004
Dressed beef	965,193	16.980
Hog slaughter	1,118,879	1.846
Dressed hogs	854,159	15.033
Sheep and lamb slaughter	25,753	.042
Dressed sheep and lamb	12,876	.227
Total transportation payments, Minnesota	NA	36.782

* Source: Livestock Slaughter Annual Summaries, Crop Reporting Board, ESCS/USDA.

** Base rate equals \$.22/cwt/100 miles with 75 mile distance for live animals, and 800 miles for dressed animals.

Table 9

Packer Purchase of Livestock Through Auction and
Terminal Markets with Commissions and Fees
(1975-77 Average)

		U.S.	6-State Region	Minnesota
		- - - - 1,000 head - - - - -		
<u>Terminal Markets (% of total)</u>				
Cattle	13.2	5,439	1,887	199
Calves	7.6	407	67	1
Hogs	16.3	11,816	4,970	778
Sheep and lambs	13.7	936	154	31
<u>Auction Markets</u>				
Cattle	14.6	6,016	2,076	220
Calves	60.7	3,252	539	8.6
Hogs	13.3	9,641	4,055	634
Sheep and lambs	12.0	820	135	27.6
<u>Total Commissions for Auction and Terminal Markets</u>		- - - - - \$1,000 - - - - -		
Cattle	(3.35/head)*	38,374	13,276	1,403
Calves	(1.67/head)**	6,128	1,015	16
Hogs	(1.14/head)*	24,460	10,319	1,598
Sheep and lambs	(1.50/head)**	2,634	433	88
Total Commissions		71,596	25,043	3,105

* Rates based on marketing expenses at a midwest terminal market, includes yardage and commission fees.

** Estimated

Table 10

Employment and Weekly Earnings in the
Meat Packing Industry (1975-77 Average)*

	U.S.	6-State Region	Minnesota
Total federally inspected plants (cattle and hogs)	2,799	358	113
Total employees	170,000	21,743	6,863
Production workers	135,000	17,266	5,450
Average weekly earnings	\$250	\$250**	\$250**

* Estimated using data from Meatpacking Industry Survey reported in Annual Financial Review of the Meat Packing Industry, American Meat Institute.

** No reliable basis exists for estimating these categories separately from the U.S. average.

Table 11

Total Sales of Livestock Products
(1975-77 Average)*

Commercial Slaughter	Average Live Weight Production	Percentage of National Production	Total Sales as Finished Product
	1,000 lbs	%	\$ million
<u>U.S.</u>			
Total meat slaughter	61,962,776	100	37,207
Hog slaughter	17,451,263	28	10,418
Cattle, calves, sheep and lamb	44,511,513	72	26,789
<u>6-State Region</u>			
Total meat slaughter	21,685,483	35	12,844.2
Hog slaughter	7,294,878	41	4,271.5
Cattle, calves, sheep and lamb	14,390,605	32	8,572.7
<u>Minnesota</u>			
Total meat slaughter	2,773,507	4.4	1,646.82
Hog slaughter	1,138,879	6.5	682.39
Cattle, calves, sheep and lamb	1,634,628	3.6	964.43

* Source: Constructed using aggregate data from American Meat Institute, Financial Facts about Meat Packing Industry and estimating distribution for the 6-state region and for Minnesota.

Table 12

Weekly Values for Key Economic Components of the
Livestock Slaughter and Transportation Industries*

	U.S.	6-State Region	Minnesota
- - - - - \$ million - - - - -			
<u>Sales of Meat Packing Industry</u>			
Total sales	715	247	31
Hog slaughter	200	82	13
Cattle, calves, sheep and lamb	515	165	18
- - - - - \$ thousand - - - - -			
Wage bill for production workers in meat packing industry	33,750	4,316	1,306
<u>Commissions of Auction and Terminal Markets</u>			
Hogs	470	198	30.7
Cattle, calves, sheep and lamb	906	283	28.9
<u>Transportation Bill</u>			
Cattle and calves	10,236	3,338	83.6
Sheep and lambs	4,977	2,083	32
Hogs	149	34	5.17

* Source: Derived from data in preceding tables.

Milk Assembly and Movement

The marketing of milk in the United States involves a large number of organizations and agencies. There are three primary stages in the marketing of milk. They are:

- 1) Collection and subsequent movement of milk from farms to assembly and processing plants plus some longer over-the-road hauling of fluid milk to other consumption centers,
- 2) Processing, manufacturing and packaging of manufactured dairy products and milk for fluid use,
- 3) Distribution of fluid milk and manufactured products to retail outlets or directly to consumers, the latter including commercial and institutional establishments.

Not many years ago the basic assembly of milk was done by trucks picking up milk in cans from the individual farms and delivering it to milk plants. During recent years milk assembly has changed significantly. Most dairy producers have installed large cooling tanks which receive milk directly from milking machines. Milk is then picked up from farms every other day or so by large bulk tank trucks which pump it directly from the cooling tanks.

Since milk is considered to be a highly perishable product, it must be refrigerated and either consumed within a short period of time or manufactured into dairy products that are less perishable and bulky. Milk for fluid use is transported from farms to processing plants where it is processed and packaged. The processor or distributor then delivers the milk directly to consumers, retail stores and institutions. Figure 5 shows the movement of milk and milk products from the producer to the final consumer.

The development of bulk handling methods expanded the area from which milk may be collected for processing and subsequent distribution. Assembly routes of milk from farms to plants vary from 30 to 300 miles but most plants obtain their supply of milk from within a 45 mile radius.^{10/} Total milk assembly costs are estimated at about \$.30 per hundredweight 1975-77.^{11/} Some milk is moved to more distant consumption centers via over-the-road bulk-milk trucks. Costs of such movement were estimated to be about .25¢ per hundredweight mile in 1976.^{12/}

On the distribution side, improvement in transportation and the development of the paper container have contributed in expanding sale areas for fluid milk. There are examples of packaged milk shipped up to 500 miles. However, most fluid milk is shipped less than 100 miles from processing plants.^{13/}

^{10/} Nolte, G. M. and E. F. Koller, "Economic Analysis of Farm-to-Plant Milk Assembly," Agricultural Experiment Station Bulletin No. 512, University of Minnesota, 1975, p. 10.

^{11/} Modification of data from Purdue Agricultural Experiment Station Bulletin 61, "Methods of Reducing Farm to Plant Milk Assembly Costs," October 1974.

^{12/} Harold W. Lough, Truck Transportation Costs of Bulk Milk, ESCS, USDA, 1977.

^{13/} Economic Report on the Dairy Industry, Staff Report to the Federal Trade Commission, Washington, D.C., March 1973, p. 51.

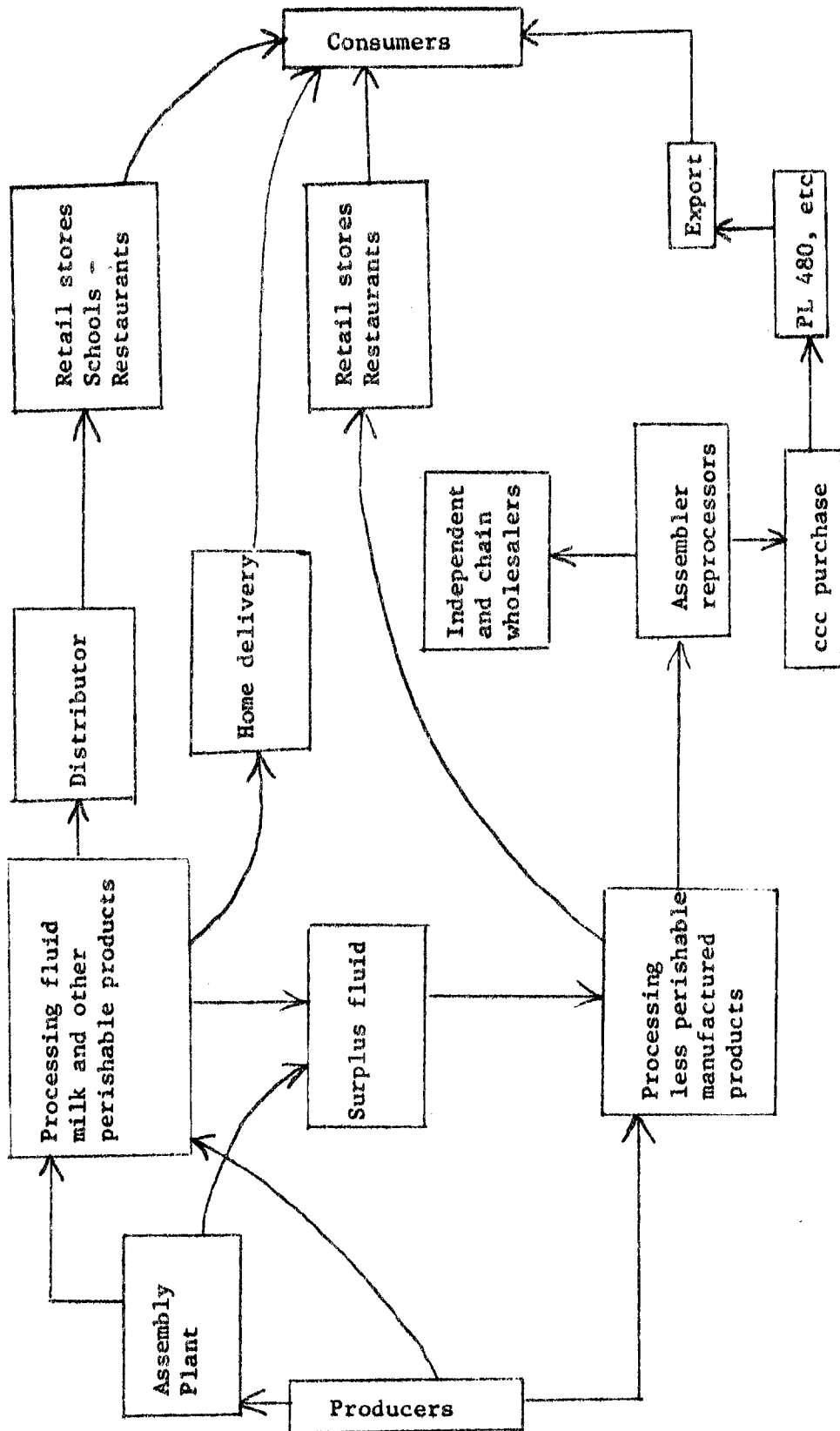


Figure 4. Milk Marketing System in the United States

Because transportation costs from dairy processing and manufacturing plants to retail outlets or directly to consumers are hard to estimate, we have included such costs in dollar business volumes as a "value added" figure.

Table 13 lists other key economic data for the U.S. dairy industry. With more than 190 thousand employees the dairy industry exceeds the meat packing industry in total employment. Table 14 shows that more than 50 percent of the butter, 61 percent of the cheese and almost 50 percent of the non-fat dry milk were manufactured in the 6-state study region in 1975-77. Thus a moratorium on the movement of milk and dairy products would have immediate and major economic impacts on the dairy industry in this 6-state region.

Table 13

Key Economic Data for U.S. Dairy Industry
(1975-77 Average)*

Total employees (thousands)	192.5
Production workers (thousands)	102.2
Average weekly earnings (dollars)	202

*Bureau of Labor Statistics and estimated from various sources.

Table 14

Production of Major Manufactured Dairy Products
(1975-77 Average)*

	Butter	Cheese	Non-Fat Dry Milk**
	- - - - - 1,000 lbs - - - - -		
U.S.	1,016,005	3,163,168	1,011,202
6-state region	511,825	1,931,667	501,294
Minnesota	197,983	385,769	219,399

* Source: Dairy Products Annual Summaries, Crop Reporting Board, USDA/SRS.

**Manufactured for human consumption.

Associated Industries Supplying Inputs

Though a number of firms and industries supplying inputs to the livestock and livestock products industries will be affected by moratoria on the movement of livestock and livestock products, appraisal of the economic impact on them depends heavily on the type of moratorium, on its location and on the time of year when it occurs. Moreover, much of this economic impact is of a temporary nature and can be recovered via expanded business when the moratorium is ended. Thus, our general approach is to identify these economic impacts when they appear important but not to attempt a detailed quantification of them.

Economic Impact on Consumption Sector

The economic impact on consumers of a moratorium on the movement of livestock and livestock products depends importantly on several considerations including:

- 1) The aggregate consumption of the categories of food which are derived from the affected livestock and livestock products involved
- 2) The inventory amounts of these food categories that are available via pipeline sources (in storage and in wholesale and retail inventories) and
- 3) The availability and cost of unaffected (by the moratoria) substitute foods.

Though a longer term moratorium would have some additional impact on consumer satisfaction (utility) as a result of reduced consumer choice, it is difficult to quantify this as a cost and, in any event, it will be mainly of a transitory nature.

Table 15 shows the per capita consumption (1975-77) for the major categories of foods derived from animals and animal products. It also shows the estimated per capita expenditures for each category.

Table 16 presents a brief picture of the pipeline stocks of meat and dairy products in cold storage. These inventories generally suggest that consumer requirements for butter and cheese during a 30-day moratorium on the movement of livestock and livestock products can be serviced from existing inventory stocks for even the 6-state region analyzed here. Year-end stocks of non-fat dry milk ranged from 470 million to 680 million pounds during the 1975-77 period. These are amounts more than ample to substitute for the supply losses of fluid milk for any of the moratoria situations considered. Inventory stocks of fresh and frozen beef and pork will be quickly expended, however, and the pipeline for fluid milk is virtually non-existent except for dairy plant-retailer stocks required to service current consumer purchases.

Though we have not listed in detail those food products which substitute closely for meat and dairy products they include mainly fish, poultry, eggs and cereal products. Some vegetables, fruit juices and a variety of canned foods also have some lesser degree of substitutability.

We turn now to estimating the economic impact for the various moratoria situations identified in Table 1.

Table 15

U.S. Population and Per Capita Consumption of Meat,
Milk and Other Dairy Products
(1975-77 Average)

Population July 1, 1975-77 Average = 215.2 million

<u>Civilian Consumption*</u>	<u>Total Consumption</u>	<u>Estimated Per Capita Consumer Expenditure**</u>
(lbs per capita)	(million lbs)	(dollars)
Beef: 92.6	19,926	130
Pork: 54.2	11,672	73
Cheese: 15.6	3,350	26.50
Condensed and evaporated milk: 4.0	852	1.40
Butter: 4.5	975	5.60
Fluid milk and cream: 291	62,576	55

* Source: National Food Review, June, 1978.

**Estimated from various price data including BLS estimated Retail Food Prices, USDA/ESCS-23, "Retail Meat Prices in Perspective," May, 1978 and other ESCS data series.

Table 16

Minimum, Maximum and Average Percentage of Annual Use
Requirements of Meat and Dairy Products in Cold Storage
(1975-77)

	Maximum % Annual Use in Cold Storage	Minimum % Annual Use in Cold Storage	Average % Annual Use in Cold Storage
Butter	27.51	2.64	9.42
Cheese	16.67	10.59	14.00
Evaporated and condensed milk	2.90	.03	.174
Frozen beef	2.40	1.37	1.81
Frozen pork	3.01	1.37	1.93

Source: Constructed from various reports of USDA.

Economic Impact of a 7-Day Moratorium on the
Movement of Livestock and Livestock Products

As indicated in Table 1, no analysis was made of the possible impact of a 7-day moratorium on the movement of livestock and livestock products in the 3-county area.

Economic Impact on 1-State Area (Minnesota)

As indicated in Table 17, the major economic impact of a 7-day moratorium is expected to fall on the production sector. We estimate that decreased feed efficiency will average \$2 per head for marketable fed cattle held back for one week and \$.40 per marketable hog impacted by the moratorium. No price discounts are expected for either cattle or hogs for this short moratorium situation. Because of its high degree of perishability, most of the milk produced after the second or third day of the moratorium will be lost. This totals to about 60 percent of the milk production during the 7-day moratorium.

Table 17
 Estimated Economic Impacts of Short-Term (7-Day) Moratoria
 on Movement of Meat Animals and Milk (1975-77 Basis)

1-State (Minnesota)		
Sector Impacted	Nature of Impact	Amount of Non-recoverable Economic Impact
		\$ Thousand
Production:		
Cattle	Decreased feed efficiency	30
Hogs	Decreased feed efficiency	40
Milk	60 percent of production lost via dumping	10,250
Associated Industries:		
Marketing, Transportation, Meat Packing and Dairy Processing	Only nonrecoverable losses are to dairy sector (transportation and processing)	600
Consumption Sector:	Some discomfort due to nonavailability of fluid milk within moratorium area only and some shift to fluid milk substitutes (principally dry milk powder). Pipeline stocks adequate for other food categories.	Nil
	Total Minnesota	10,920
6-State Region		
Production:		
Cattle	Same as above	320
Hogs	Same as above	260
Milk	Same as above	37,250
Associated Industries:		
Marketing, Transportation, Meat Packing and Dairy Processing	Same as above	2,180
Consumption Sector:	Same as above plus some spot unavailability of fresh and frozen meat products.	Nil
	Total 6-State Region	40,010

Almost all industries in the state of Minnesota which are associated with the livestock and livestock products sector will be impacted by a 7-day moratorium. Most of this impact will, however, be transitory and thus will be recoverable at the end of the moratorium period. Though some packing plant workers will be furloughed during a 7-day moratorium as will some employees in the transportation sector, voluntary vacations and reassignment of employees to plant clean-up, etc., will minimize economic impacts to all sectors except dairy transportation and processing. We have projected an economic loss to transportation and processing industries affected by the milk loss to total about \$600 thousand. This loss is about equally divided between the transportation and the processing plant-related subsectors.

The consumption sector will be affected minimally by a 7-day, 1-state moratorium. There will, in all likelihood, be some consumer discomfort due to nonavailability of fluid milk within the moratorium area after about the fourth day - but only in the moratorium area. This will necessitate some shift to fluid milk substitutes, principally dry milk powder. Pipeline stocks of other food items are adequate to minimize any economic impact to consumers.

In total, the economic impact of a 7-day, 1-state moratorium could approach an estimated \$11 million (Table 17).

Economic Impact on 6-State Region

As also shown in Table 17, the economic impact of a 7-day moratorium in the 6-state region parallels the impact for the 1-state area but on a larger scale. Because this particular 6-state region is a major producer of pork and beef, some spot unavailabilities of fresh and frozen meat products will likely show up toward the end of the 7-day moratorium period. This economic impact is not substantial, however, and will be limited almost entirely to the region included under moratorium.

The total estimated economic impact of a 7-day moratorium for the 6-state region is about \$40 million. As in the case of the 1-state area the major portion of this projected economic impact (over \$37 million) is from the loss, by producers, of milk income.

Economic Impact of a 14-Day Moratorium on the
Movement of Livestock and Livestock Products

As indicated in Table 1, the 14-day moratorium is considered a possibility for each of the three subnational study areas. We also consider the possibility of the moratoria being either (1) for all animals and all livestock products or (2) for swine and pork only. Results of the 14-day moratorium analysis are shown in Table 18.

Economic Impact on 3-County Area

The economic impact of a 14-day moratorium will, as for the 7-day moratorium, fall mainly on the production sector. We estimate the producer cost from decreased feed efficiency will increase to \$4 per head for marketable fed cattle held back for 14 days. Feed inefficiencies for marketable hogs are increased but the 14-day marketing delay results in very little price discounting because of excessively heavy weights. An estimated 90 percent of milk produced in the moratorium area during the second week is dumped and the income is lost to producers. Though significant economic impacts will accrue to the industries associated with transportation, livestock slaughter and dairy processing, the area is small enough so that these losses total to less than \$60 thousand. An estimated 80 percent or more of the associated industry losses pertaining to beef and hogs will be recovered subsequent to the end of the moratorium.^{14/} Since consumers in the 3-county area have easy access to supplies of milk and meat outside of the moratorium area, there is no significant impact to the consumption sector except for inconvenience. Total economic impact of the "swine-pork only" moratorium is estimated at \$13.5 thousand while the all animals-all products moratorium costs exceed an estimated \$600 thousand. Again, as for the 7-day moratorium, it is milk producers and the industries handling milk and dairy products that suffer most of the economic impact.

Economic Impact on 1-State Area (Minnesota)

The estimated economic impact of a 14-day moratorium for the state of Minnesota parallels that of the 3-county area. The total economic impact of the swine-pork only moratorium is estimated at \$216.5 thousand whereas the all animal-all product moratorium approaches an estimated \$28 million. With the all animal-all product moratorium, a fairly high proportion of consumers in the state will be forced to shift to using substitutes for fresh fluid milk, primarily dry milk powder. Though one can expect some spot location shortages of fresh and frozen meat products, pipeline stocks of meat will be adequate to service any consumers to whom these products can be transported. And, there will be little, if any, economic impact on consumers outside of the moratorium area.

^{14/} For this situation and for all "associated industries" losses for the 14 and 30 day moratoria, we have varied the rate of "non-recoverable losses" for individual categories of losses. These voluminous data are not, however, reported in detail here.

Table 18

Estimated Economic Impacts of Medium-Term (14-Day) Moratoria
on Movement of Meat Animals and Milk (1975-77 basis)

3-County Area		
(Swine and Pork Only)		
Sector Impacted	Nature of Impact	Amount of Non-recoverable Economic Impact
		\$ Thousand
Production:		
Hogs	Decreased feed efficiency	7.5
Associated Industries:		
Marketing, Transportation and Meat Packing	Loss of business and employment (80 percent or more is recovered)	6
Consumption Sector:	Nil	Nil
Total Impact		13.5

(All Animals, All Products)		
Production:		
Cattle	Decreased feed efficiency	3.1
Hogs	Decreased feed efficiency	7.5
Milk	Loss of 60 percent first week. Loss of 90 percent second week.	538
Associated Industries:		
Marketing, Transportation, Meat Packing and Dairy Processing	Loss of business and employment (except for dairy, 80 percent or more is recovered)	59
Consumption Sector:	Nil	Nil
Total Impact		607.6

Table 18 (Continued)

1-State (Minnesota)		
(Swine and Pork Only)		
Sector Impacted	Nature of Impact	Amount of Non-recoverable Economic Impact
		\$ Thousand
Production:		
Hogs	Decreased feed efficiency	120.3
Associated Industries:		
Marketing, Transportation and Meat Packing	Loss of business and employment (80 percent or more is recovered)	96.2
Consumption Sector:	Nil	Nil
Total Impact		216.5
(All Animals, All Products)		
Production:		
Cattle	Decreased feed efficiency	90.9
Hogs	Decreased feed efficiency	120.3
Milk	Loss of 60 percent first week. Loss of 90 percent second week	25,742
Associated Industries:		
Marketing, Transportation, Meat Packing and Dairy Processing	Loss of business and employment (except for dairy, 80 percent or more is recovered)	1,933
Consumption Sector:	Some shift to milk substitutes, particularly dry milk powder	Nil
Total Impact		27,886.2

Table 18 (Continued)

6-State Region		
(Swine and Pork Only)		
Sector Impacted	Nature of Impact	Amount of Non-recoverable Economic Impact
		\$ Thousand
Production:		
Hogs	Decreased feed efficiency	786
Associated Industries:		
Marketing, Transportation and Meat Packing	Loss of business and employment (80 percent or more is recovered)	629
Consumption Sector:	Nil	Nil
Total Impact		1,415

(All Animals, All Products)		
Production:		
Cattle	Decreased feed efficiency	724
Hogs	Decreased feed efficiency	786
Milk	Loss of 60 percent first week. Loss of 90 percent second week	103,180
Associated Industries:		
Marketing, Transportation, Meat Packing and Dairy Processing	Loss of business and employment (except for dairy, 80 percent or more is recovered)	10,740
Consumption Sector:	Major shift to dry milk powder. Some involuntary shift to other protein foods, including poultry, eggs, cheese, etc. Some price effects showing up.	500
Total Impact		115,930

Economic Impact on 6-State Region

The economic impact of a 6-state, 14-day moratorium for swine and pork only is estimated at over \$1.4 million but when all animals and all products are included this economic impact grows to almost \$116 million. Again, the major economic impact is attributable to loss of milk and dairy products and related economic activity in the dairy sector. Because of the importance of the 6-state region in meat production, a 14-day moratorium will necessitate some involuntary substitution of other protein foods, including poultry, eggs, cheese, etc., for meat. Fortunately, pipeline stocks of cheese, butter and dry milk will provide adequate supplies of these substitute products for moratorium region consumers. Pipeline stocks of fresh and frozen beef and pork will, however, be used up before the end of this 14-day moratorium and there will be some modest impact to consumers outside of the moratorium area in the form of short meat supplies, tightened supplies of fresh milk, and modest increases in the price of meat and dairy products at retail. We have, however, estimated that absolute cost increases to consumers will be modest for a 14-day moratorium, perhaps totalling \$500 thousand for the all animal-all product moratorium.

Economic Impact of a 30-Day Moratorium on the Movement of Livestock and Livestock Products

As indicated in Table 1, the 30-day moratorium is considered a possibility for the 3-county and 1-state (Minnesota) areas only. The possibility of implementing a moratorium for as long as 30 days and for an area as large as the 6-state region appears remote. Thus, we have not considered this alternative in our economic impact analysis. Results of the 30-day moratorium analysis are shown in Table 19.

Economic Impact on 3-County Area

Again, as for the shorter term moratoria, the major economic impact of a 30-day moratorium falls on dairy producers and on industries related to transporting and processing milk and dairy products. Whereas a "swine and pork only" moratorium has an estimated economic impact of almost \$48 thousand, the economic impact of the "all animal-all product" moratorium totals more than \$1.4 million. Though economic impacts to the transportation and meat packing industry are substantial for halting the movement of cattle and hogs, an estimated 70 percent or more of this impact will be recoverable after the moratorium ends. Because of its high degree of perishability, however, milk losses are of a more permanent nature, both to producers and to industries associated with dairy. As in the case of the 14-day moratorium, the 3-county area has no significant impact on consumers since they can purchase food items outside of the moratorium area with only a minimum of inconvenience.

Table 19
 Estimated Economic Impacts of a Long-Term (30-Day) Moratorium
 on Movement of Meat Animals and Milk

3-County Area		
(Swine and Pork Only)		
Sector Impacted	Nature of Impact	Amount of Non-recoverable Economic Impact
		\$ Thousand
Production:		
Hogs	Decreased feed efficiency and price discounts	29.4
Associated Industries:		
Marketing, Transportation and Meat Packing	Loss of business and employment (70 percent or more is recovered)	18.2
Consumption Sector:	Nil	Nil
Total Impact		47.6
(All Animals, All Products)		
Production:		
Cattle	Decreased feed efficiency	10.7
Hogs	Decreased feed efficiency and price discounts	29.4
Milk	Loss of 60 percent first week. Loss of 90 percent after first week	1,184
Associated Industries:		
Marketing, Transportation, Meat Packing and Dairy Processing	Loss of business and employment (except for dairy, 70 percent or more is recovered)	210
Consumption Sector:	Nil	Nil
Total Impact		1,434.1

Table 19 (Continued)

1-State (Minnesota)		
(Swine and Pork Only)		
Sector Impacted	Nature of Impact	Amount of Non-recoverable Economic Impact
		\$ Thousand
Production:		
Hogs	Decreased feed efficiency, price discounts	471.5
Associated Industries:		
Marketing, Transportation and Meat Packing	Loss of business (70 percent or more is recovered)	310
Consumption Sector:	Nil	Nil
Total Impact		781.5
----- (All Animals, All Products)		
Production:		
Cattle	Decreased feed efficiency	313
Hogs	Decreased feed efficiency and price discounts	471.5
Milk	Loss of 60 percent first week. Loss of 90 percent after first week.	56,725
Associated Industries:		
Marketing, Transportation, Meat Packing and Dairy Processing	Loss of business and employment (except for dairy, 70 percent or more is recovered)	6,240
Consumption Sector:	Continued reliance on milk substitutes, particularly dry milk powder. Some modest price increases at retail.	200
Total Impact		63,949.5

Economic Impact on 1-State Area (Minnesota)

The economic impact of a 30-day moratorium on the movement of swine and pork only is estimated to total \$781.5 thousand for the 1-state area. This impact increases to almost \$64 million under the "all animal-all product" moratorium. In addition to the producer losses from reduced feeding efficiency and, in the case of hogs, price discounts, a 30-day moratorium will begin to cause some serious disruptions in breeding and production schedules and in the movement of breeding livestock. Though this long term moratorium creates a significant impact on those consumers in the moratorium area, their number is small relative to the total U.S. population and, consumer food requirements for this 1-state area can be easily met from pipeline stocks for meat and cheese, coupled with increased consumption of poultry and fish products on a temporary basis. Within the time span of a 30-day moratorium it is expected that significant quantities of fluid milk can be mobilized for movement into the 1-state moratorium area from producers outside of the state. But, some retail price increases will result. Continued reliance on dry milk powder as a source of substitute for fresh fluid milk will, however, be needed. We have indicated that additional costs to consumers in Minnesota would be modest, perhaps \$200 thousand or so.

Summary of Economic Impacts for Alternative Moratoria

A summary of the non-recoverable economic impacts (exclusive of program costs) for the alternative moratoria considered is presented in Table 20. This table shows that the 14-day moratorium for the 6-state region and the 30-day moratorium for one state (Minnesota) have major economic impacts. These high costs coupled with disruption and inconveniences to producers and associated industries will make these moratoria difficult to implement and to maintain. Economic impacts of the other moratoria do not appear prohibitive if the potential impact of animal disease spread is a serious one.^{15/} Perhaps the major point to be emphasized from the preceding analysis is the prominence of milk and dairy products as the major economic impact component in the moratoria for all animals and all products. This suggests that strong attention will have to be given to more limited moratoria which permit continued movement of milk to processing plants. Moratoria costs can be drastically reduced by permitting the movement of milk for human consumption only as compared to prohibiting its movement entirely. Though it can be argued that economic losses to "associated industries" would be greater than we have estimated, we judge that most of these losses, except for dairy, will be recovered upon termination of the moratoria.

^{15/} The potential losses from such animal diseases as FMD as shown in USDA Technical Bulletin 1597, for example, are overwhelming compared to the economic impact of any of the moratoria on movement of livestock and livestock products considered here.

Table 20

Summary of Non-recoverable Economic Impacts for Alternative Moratoria

Type of Moratorium	Estimated Economic Impact (\$ Thousand)		
	3-County Area	1-State (Minnesota)	6-State Region
7-Day All Animals, All Products	NA	10,920	40,010
14-Day All Animals, All Products	607.6	27,862	115,930
30-Day All Animals, All Products	1,434.1	63,949.5	NA
14-Day Swine-Pork Only	13.5	216.5	1,415
30-Day Swine-Pork Only	47.6	781.5	NA