

AN APPRAISAL OF METHODS OF LIMITING DIRECT
PAYMENTS TO HOG PRODUCERS

by

William David Dobson

A Thesis Submitted to the
Graduate Faculty in Partial Fulfillment of
The Requirements for the Degree of
MASTER OF SCIENCE

Major Subject: Agricultural Economics

Signatures have been redacted for privacy

Iowa State University
Of Science and Technology
Ames, Iowa

1961

1124-41

HB233.59

D656a

c. 2

TABLE OF CONTENTS

	Page
INTRODUCTION	1
Recent Government Assistance to Hog Producers	1
Possible Alternative Programs	3
Objectives of This Study	4
REVIEW OF LITERATURE	7
THE CANADIAN DIRECT PAYMENT PROGRAM FOR HOG PRODUCERS	16
The Agricultural Stabilization Act	16
The Direct Payment Program	19
Possible Adaptations to a Direct Payment Program for United States Producers	28
ESTIMATED EFFECTS OF LIMITING DIRECT PAYMENTS TO A MAXIMUM NUMBER OF HOGS PER PRODUCER	32
Estimated Effects of Alternative Size Limits	33
A Cost Comparison between Limited and Unlimited Direct Payment Programs	43
Estimated Effects of Limiting Payments on the Distribution of Income	49
Possible Subsequent Effects of Limiting Payments	56
Appraisal of the Limited Direct Payment Program	68
THE USE OF A LIMITED DIRECT PAYMENT PROGRAM TO REDUCE PRICE UNCERTAINTY	71
Price Uncertainty	72
A Seasonally Adjusted Base Price	73
Operational Features of the Hypothetical Direct Payment Program	77

TABLE OF CONTENTS (Continued)

	Page
Estimated Weekly Payments	81
Comparison with Payment on an Annual Basis	85
The Limit of Payments Provision	89
Appraisal of the Program	90
DIRECT PAYMENTS FOR HOG PRODUCERS LIMITED TO QUOTA MARKETINGS	92
Announcement of the Quota	93
Methods and Assumptions used in Establishing the Hypothetical System of Quotas	94
Estimating 1959 Pork Supplies	95
Apportioning the Quotas	99
An Alternative Basis for Quota Allocation	100
Estimated Payments	105
The Use of Quotas for Supply Control	108
Appraisal of the Program	112
SUGGESTIONS FOR FURTHER STUDY	114
SUMMARY	116
Estimated Effects of Limited Payments	116
Comparative Costs and Effects on Production Efficiency	123
LITERATURE CITED	125
ACKNOWLEDGMENTS	129
APPENDIX	130

INTRODUCTION

A recurrence of low hog prices, like those experienced by producers during 1955 and 1956, could cause demands for increased government assistance to hog producers. There is a possibility of cyclically high hog and beef marketings occurring in 1962 (26, p. 19). If this happened, hog prices would be depressed by the high hog marketings and the competition from low priced beef. The present legal provisions for government assistance to hog producers extend only to purchases of pork and lard and encouragement of exports. These might not be effective against a major price decline.

Recent Government Assistance to Hog Producers

Since March 1950, government assistance to hog producers has consisted of diversion of pork and lard surpluses through outlets designed to expand consumption. The bulk of the pork and lard purchases has been under Section 32, Public Law 320 (32, p. 32) for donation to school lunch programs, charitable institutions and welfare agencies. Purchases under Section 32 are made on a competitive basis through regular trade channels and are limited to quantities that can be utilized by eligible outlets. With the exception of the purchase activities during 1955, the government expenditures under Section 32 have been small. In 1955 the government purchased

197,000,000 pounds of pork and lard. The purchases and the handling charges required an outlay of \$101,000,000. The Section 32 expenditures for 1951 through 1960 are shown in Table 1.

Table 1. Government purchases of pork and lard with Section 32 funds or with funds transferred from Section 32^a

Years beginning July 1	Pork		Lard	
	Quantity (million pounds)	Value (million dollars)	Quantity (million pounds)	Value (million dollars)
1951	23	12	0	0
1952	0	0	0	0
1953	0	0	0	0
1954	0	0	0	0
1955	158	95	39	6
1956	6	0	22	4
1957	0	0	0	0
1958	29	13	0	0
1959	0	0	91	10
1960 ^b	32	18	19	3

^aData from (33, Nov. 1957; March 1959; March 1960; May 1960; Jan. 1961; March 1961)

^bMay be incomplete

Possible Alternative Programs

If increased government aid were required in the future the assistance could take the form of a purchase and storage program. Storage problems, however, are encountered in extensive storage operations. Not only are pork storage operations expensive, but pork generally cannot be held for more than about 9 months (43, p. 158) in cold storage without some deterioration. This means that it needs to be returned to the market soon after it is taken off, depressing prices about as much when it is returned as it raised them when it was taken off.

Direct payments, which involve no storage operations, could be used as an alternative to purchase and storage of pork. With direct payments, open market prices would prevail and markets would be allowed to clear. The government would then make up the difference between the support price it had announced and the average open market price to producers.

The cost of a direct payment program for hog producers could be quite high. The demand for pork is inelastic, (28, p. 19) and it would require a greater Treasury outlay to guarantee producers a given level of support with direct payments than with price supports (27, p. 222). Although consumers would benefit from full consumption of all the pork produced, the high prospective cost of a direct payment

program tends to lessen its political acceptability.

One way to reduce the Treasury costs and possibly increase the political acceptability of a direct payment program would be to limit payments to only a portion of the hogs marketed. By limiting payments the government could reduce the cost of the program and possibly attain other economic objectives.

Objectives of This Study

This study is an appraisal of limited direct payment programs for several alternative objectives. Specifically the following tasks are undertaken:

(a) The Canadian direct payment program for hog producers limits payments to 100 grade A or B hogs per producer. This program is evaluated to gain some knowledge of the operation and effects which a limited direct payment program for hogs might have on United States hog producers. An appraisal is made of the applicability of the provisions of the Canadian program for a direct payment plan for United States producers. Some of the features of the Canadian program are considered for their possible inclusion in programs for United States producers.

(b) An estimate is made of the probable effects of a direct payment program for United States producers that would limit payments to a uniform, maximum number of hogs per

producer. A program such as this could be used for several other objectives in addition to reducing the cost of the program; it could be used to encourage a particular size enterprise, to make payments more in accordance with need for assistance, or to redistribute income among producers.

(c) An estimate is also made of the effects of a direct payment program that would limit payments to producers of barrows and gilts, with other slaughter classes excluded from eligibility for payments. The program considered is designed to reduce price uncertainty in hog production. The primary objective of the limit in this case is to reduce program costs. Payments are limited to barrows and gilts, since unexpected changes in the prices of this slaughter class has the greatest effect on producers.

(d) Finally, an estimate is made of the applicability of a direct payment program that would restrict payments to quota marketings. The primary objective of the program is supply adjustment. Direct payments are limited to the hog marketings needed to provide a stable future pork supply.

Each of the direct payment programs for United States producers specified above is appraised with respect to probable cost and effect on production efficiency. As a basis for estimating the acceptability of a program, the costs of the various programs are compared with possible expenditures under the existing assistance program. If the

cost of a direct payment program is considerably in excess of the previous high, \$101,000,000 in 1955, the acceptability of the program is considered questionable. An attempt is made also to estimate whether the programs would contribute to more efficient or less efficient resource use in hog production.

REVIEW OF LITERATURE

A number of writers in discussing or advocating direct payment programs have indicated that payments could be restricted for one or more objectives. Payment limitations have been suggested as a way to (a) prevent producers from expanding the production of surplus commodities, (b) guide production and marketing along improved lines, (c) reduce the public resentment caused by large subsidies to successful producers, (d) redistribute income among producers and (e) discourage large scale producers.

Galbraith (22, pp. 298-299) suggests that many of the problems encountered under present agricultural legislation stem from the present technique of support, i.e., purchase and storage. Direct payments are cited as a substantial reform since the foreign trade problems would be lessened, both perishables and non-perishables could be supported, and there would be no accumulation of surpluses in storage. He indicates that the protection given farmers could be substantially the same with direct payments as with price supports; and thus, the incentive to produce would be as great as with price supports. Galbraith points out that excess production would remain and cause low market prices and proportionately greater government payments in order to guarantee producers a given level of support. He proposes a system of quotas to

retard the expansion in production of unwanted commodities by denying direct payments for over-quota production. The objective of this reduction in marginal revenue is to discourage expansions in output.

Brandow (2, pp. 716-730) outlined a direct payment program in 1955 containing a quota provision similar to the one described by Galbraith. The objective of Brandow's program was to use price for both income and resource allocation by dividing each producer's output into a major portion receiving income support and a residual portion on which the market value of marginal production is realized. He suggested the initial coverage of 20 commodities, including cattle and hogs. The program called for an assignment of marketing allotments on the basis of historical production during a 3 year base period, and payments for a maximum of 75 percent of the marketing allotment.

Brandow points out that the proposed program would assist producers in proportion to their marketings and would be of little help to families on small, inadequate farm units. He advocated completely different approaches to deal with the problems of severely low income farmers. Brandow indicated, however, that the family farm should be encouraged in preference to the giant farm. A limit on the amount paid to an operator in a single year was suggested. He qualified this by saying that the operators of giant farms ordinarily have

less need for income support than operators of family farms, larger family size farms appear to be as efficient as very large units, and public acceptance of a program would be undermined if very large payments are made to individual producers.

In 1960 Brandow (3, pp. 65-74) outlined two more direct payment programs, each of which would provide direct payments for producers of most of the important agricultural commodities. The first program would provide unlimited payments for producers of the eligible commodities. The second program outlined contains two provisions which would limit payments. Payments would be restricted to \$2,500 for a single farm operator or owner. They would also be limited to a maximum amount of physical sales or production from a single operator. The \$2,500 limit was included to adjust payments more nearly to the need for income support. The second limitation is consistent with the first but has the special purpose of removing inducements to expand production.

Under the proposed program a base for payment purposes is assigned to each farm in terms of production units with one bushel of corn equaling one production unit. The base represents the farm's recent production or sales. The maximum base for any farm would be 10,000 production units and payments would be limited to 80 percent of the base. Payments under the program would be made on the eligible commodities

in years when their market prices are less than 80 percent of parity.

Waugh (44, pp. 776-777) suggested a combination direct payment, price support and storage program. A proposed program was outlined with government purchase and storage for commodities only moderately in surplus. Direct payments were to be used to make up the difference between the market price and 90 percent of parity for commodities that became excessively in surplus.

Waugh, like Galbraith and Brandow, indicated that production controls might be necessary since direct payments like market price supports would tend to maintain a high level of production, even during periods of falling demand. Quotas were recommended for producers of surplus commodities, with the open market price for production in excess of quotas.

Halcrow, (23, p. 328) while discussing direct payment programs and the Brannan plan, pointed out that Secretary of Agriculture Brannan, in deference to the family farm ideal, had suggested that a limit be placed on the maximum amount paid to a single farm operator through price supports or production payments. Brannan suggested that payments be limited to an amount of produce equal to 18,000 bushels of corn or its equivalent (roughly \$25,000 of cash receipts in 1949).

Shepherd (27, pp. 214-215) calls for a careful definition

of program objectives when deciding whether payments should be made according to ability or need. He points out that an income stabilization program has as an objective the stabilization of individual incomes at about their open market levels in normal times. This necessitates large payments for large scale producers and small payments for producers with a small sales volume. Shepherd further states that equalizing incomes among producers at a given point of time calls for measures entirely different from those used for stabilizing incomes over time. He states that equalization of incomes cannot be attained by price plans, nor by direct income payment plans, except by limitations on the size of payments, which would impair the attaining of a stabilization objective.

Soth (29, p. 637) suggests that direct payments could be used to guide and direct farm production to better fit consumer demand. For example, Soth indicated that direct payments could serve as a premium for the producers of the meat type hog. Likewise, production of the lard type hog could be discouraged if no payments were allowed for these animals.

Eggert (19, pp. 826-827) outlined a proposed direct payment program and recommended that, wherever possible, direct payments should be made only to producers meeting certain standards of efficiency in production. Conservation and soil building practices were suggested as a prerequisite for eligibility for direct payments for crop producers.

Livestock producers were to be given direct payments only upon the performance of approved, efficient production and marketing practices. Eggert recommended that, to avoid centralization, state committees should specify the approved practices and indicate the rate of payment for each practice.

In a later article Eggert, (18, pp. 252-253) while discussing the advantages and disadvantages of direct payments, pointed out that payments could be made contingent on improved management practices. He indicated that weight and grade limits or differentials could be used when making payments for a particular product. Citing the example of the lamb and feeder cattle subsidies that were paid directly to producers, he said that the sales receipt could serve as the weight and grade indicator. He indicated that all sales within a certain price range could be assumed to be a certain grade.

In both articles Eggert maintained that if increased production of higher quality products resulted from the program it would help to justify its existence and insure continued public and congressional support for funds to cover the cost of the direct payment program.

Direct payment programs for hog and egg producers are currently in effect in Canada. The program for hog producers limits payments to a maximum of 100 hogs from the two highest carcass grades per producer. This program is discussed in some detail in the following chapter.

The Canadian direct payment program for egg producers began October 1, 1959 (11, p. 102). Under this program 4,000 dozen grade A large eggs--the top grade--is the maximum amount of production on which a producer can receive direct payments. This is the annual production from a laying flock of about 450 to 500 hens. A Canadian survey showed that about 85 percent of all Canadian egg producer had flocks of less than 500 hens prior to the adoption of the program.

Douglas Harkness, (25, p. 6) Canadian Minister of Agriculture, reported that before the adoption of the direct payment program large scale Canadian egg producers had been responsible for a sizeable increase in egg production resulting in surplus stocks and depressed egg prices. About 5 percent of the producers were marketing approximately 40 percent of the eggs. Harkness said that since large scale producers were accounting for most of the surplus they were called upon to reduce production. Harkness said that it was his opinion that a reduction in production by this group of producers would have the least unfavorable effect on the general farm economy and the prosperity of the average farmer.

Hamilton, (24, pp. 671-680) of the American Farm Bureau Federation argues against the adoption of an extensive direct payment program. Hamilton suggests that rising government costs would require limitation of payments that could lead to a leveling of per farm production and income. He makes two

initial assumptions in a discussion of direct payments. First, he assumes that the support level for the commodities given support would be high enough to provide a substantial incentive for producers to increase production; and secondly, once direct payments were made for some commodities other producer groups would demand that the support be extended to their commodity.

He says that an upward trend in the cost of a direct payment program would eventually result in the adoption of measures to limit the government's liabilities under the program. He indicated the possible types of limits that might be imposed, a limit on the total amount that may be paid to a single operator, a limit on the total amount that may be paid out, with a consequent reduction in the payments made to some classes of producers, and quota limits on the production eligible for payments.

He further relates that a good case can always be made against unlimited handouts to individual operators and that the politics of numbers is on the side of a low limitation of payments to individual farm operators.

Hamilton predicted that the efficient farm operators, i.e., those with a high production per unit of input, would be squeezed between low market prices, resulting from heavy production induced by guaranteed returns for qualifying producers, and limitations on the amount that might be paid

to any one producer. He feared that the increase in production induced by a payment program with a high support level would force market prices of some commodities so low that no producer could afford to produce more than the amount eligible for payments.

THE CANADIAN DIRECT PAYMENT PROGRAM FOR HOG PRODUCERS

The Canadian Government adopted a system of deficiency payments for hog producers on January 11, 1960 (17, p. 2). Under this program payments are limited to high quality hogs and to a maximum number of hogs per producer. The Canadian program is examined to gain some knowledge of the operation and effects of a limited direct payment program, which might be adaptable for use with United States hog producers.

In the study, the legal provisions for the program and the conditions that led to the adoption of the program are reported. The objectives of the program, the effects of the program on marketings, and the reaction of producers to the program are examined. An appraisal is made of the adaptability of the provisions of the Canadian program to a direct payment program for United States hog producers.

The Agricultural Stabilization Act

Income support for Canadian hog producers is provided by the Agricultural Stabilization Act. This act went into effect in Canada March 3, 1958 (16). Some of the features of the act are (25, pp. 2-3):

(a) Any agricultural product is eligible for support. The decision as to which product will be supported is the responsibility of the government.

(b) Nine basic commodities are supported at all times. These commodities are: cattle, hogs, sheep, butter, cheese, eggs, wheat, oats and barley. The support provided to the nine basic commodities is at a minimum of 80 percent of the average price of these commodities, at selected markets across Canada, during the previous 10 years.

(c) The Agricultural Stabilization Act provides three general methods of support. These are: purchase and storage, direct payments, and any other method, such as flat income payments on a per acre basis, which may be considered most appropriate to meet the need.

(d) The agency responsible for the administration of the act is the Agricultural Stabilization Board.

Direct payments were not used initially, after the passage of the Agricultural Stabilization Act in 1958, to support the incomes of Canadian hog producers. Instead, hog prices were maintained at support levels by direct purchase and storage of pork by the government.

In April 1958, the Canadian Government set a support price of \$25.00 per hundred weight for grade A carcasses at Toronto (17, p. 44). This level of support was in effect until October 1, 1959, after which the support price was reduced to \$23.65 per hundredweight at Toronto. This new lower support price was to be maintained until March 31, 1960. Both of the support prices were seasonally flat.

By November 1958 preparations had been made by the Canadian Government to make purchases of pork at public stockyards where and when necessary to maintain hog prices at support levels (12). Hog prices at public stockyards only were supported and prices at other points were left to seek their own levels relative to public stockyard prices.

The carcass cuts purchased by the Agricultural Stabilization Board were prepared at federally inspected plants in accordance with prescribed specifications and placed in cold storage in behalf of the board. Cuts were invoiced in balanced proportions, i.e., an equal number of each cut. To promote maximum distribution and consumption, provisions were made to allow sellers to retain certain cuts which were likely to be in short supply.

Figures on the actual pork accumulations of the Agricultural Stabilization Board are fragmentary. By May 1959 the Canadian Government had accumulated 70,000,000 pounds of pork in cold storage. Normal storage for this time of year is about 18,000,000 pounds (13). A preliminary estimate made in November 1959 indicated that total marketings for 1959 would be about 8,800,000 hogs (6, p. 45). This estimate indicated that domestic disappearance of pork would account for about 7,000,000 of the hogs marketed. Exports of pork and hogs would account for an additional half million hogs. The surplus of approximately 1,300,000 hogs, or 14.8

percent of the marketings, would be accounted for principally by Agricultural Stabilization Board purchases.

Some of the pork accumulated under purchase activities was canned to prevent spoilage. On March 4, 1960, after the termination of the direct purchase method of support, Agricultural Stabilization Board holdings of canned pork consisted of 94,000,000 pounds of canned luncheon meat and 8,400,000 pounds of canned hams (8, p. 11). The canned luncheon meats were made available, free of charge in carload lots, to approved charitable institutions and welfare organizations in Canada and other countries.

Figures on the value of pork inventories accumulated under the direct purchase program are available from the annual reports of the Agricultural Stabilization Board. On March 31, 1959 pork inventories were valued at \$20,836,220 (4, p. 2). On March 31, 1960 pork inventories were valued at \$74,085,444 (5, p. 2). Pork inventories accounted for 62.9 percent of the total value of inventories held by the Agricultural Stabilization Board on March 31, 1960.

The Direct Payment Program

In October 1959 the Canadian Department of Agriculture announced that the direct purchase program would end after January 9, 1960, to be replaced by a direct payment program (6, p. 44). The Canadian Department of Agriculture had

previously announced that direct purchase of pork would continue until March 31, 1960.

Minister of Agriculture Douglas Harkness indicated some of the policies behind present Canadian price and income support legislation in an address at the meeting of the National Farm Institute at Des Moines, Iowa in 1960 (25, p. 3). The policy objectives mentioned were: (a) providing security of income to the bulk of Canadian producers, (b) maintaining flexibility in the level of support, and as far as possible, flexibility in deciding which commodities are to be supported, and (c) improving the quality of products marketed. The provisions for carrying out these policies are evident in the Agricultural Stabilization Act and in the program of direct payments for hog producers as provided for under the act.

Under the direct payment program, payments are made for a maximum of 100 grade A or B hogs per registered producer (25, p. 5). Canadian Minister of Agriculture Douglas Harkness reported that prior to 1960 about 90 percent of the producers in Canada had commonly marketed less than 100 grade A or B hogs per year and for this reason the limit was set at 100 head (25, p. 5). Rackham* reported that in 1959 about 70 percent of the hogs marketed in Canada could have been

*Rackham, T. S., Dept. of Econ. and Soc., Iowa State University of Science and Technology, Ames, Iowa. Information on Canadian deficiency payment program. Private communication. 1960.

included under the limit.

Canadian producers are required to register with the Department of Agriculture, indicating their intention to participate in the program, and receive a registration number to become eligible for direct payments. Each producer is required to give the legal description of the location of his hog enterprise in applying for a registration number (14). Only one registration number is issued per farm and only 100 hogs are eligible for direct payments from each farm regardless of the number of owners. The Canadian Government can prevent payments from being made for more than 100 hogs from each enterprise when the legal description of each enterprise is known.

When hogs are sold and graded the producer's registration number is recorded on the carcass grading certificate. Carcass graders then forward copies of the grading certificates to the data processing unit of the Canadian Department of Agriculture where the number of grade A and B hogs marketed by each producer is recorded (14). The Canadian Government can use these figures to determine the number of hogs eligible for direct payments from each producer when the direct payments are necessary.

Approximately 183,000 producers registered* to participate in the deficiency payment program in 1960. This is about 64 percent of the total number of farms indicating a hog enterprise at the time of the 1956 census. Some of the producers, however, who indicated a hog enterprise at the time of the census, raised hogs only for home consumption (15).

The program provides for an annual determination of payment size and payment distribution. No provisions are made for interim payments. At the end of the year the Canadian Department of Agriculture computes the annual weighted average price of grade A carcasses from the weekly prices paid at the major Canadian markets. If this price is less than the support price, each registered producer receives the difference between the annual weighted average price of grade A carcasses and the support price for a maximum of 100 A and B hogs. The program requires that the same payment per hundred-weight be made for all hogs sold that were eligible for direct payments. The difference between the support price and the national weighted average price of grade A carcasses also determines the size of the direct payment for grade B carcasses.

*Baird, F. F., Canada Dept. of Agr., Ottawa, Ontario, Canada. Information on Canadian deficiency payment program. Private communication. 1960.

For 1960 the support price for grade A carcasses was set at \$22.65 per hundredweight.* This is 80 percent of the 10 year average base price and the minimum level of support allowed under the Agricultural Stabilization Act. The support price for 1961 is again \$22.65.

Seasonal price patterns are left intact by this program. Producers are induced to get the maximum price per hundredweight for each hog sold. The direct payment an individual producer could receive is independent of his sales price. Price uncertainty also remains under this direct payment program, since the size of the direct payment per hundredweight cannot be determined until the end of the year. Also producers could market hogs at prices substantially below the support price and not receive direct payments; price increases later in the year could raise the national weighted average price above the support level and no payments would be made at the end of the year.

Initial effects of the program

Some congestion occurred at Canadian markets immediately before the transition from the direct purchase to the deficiency payment program. Producers were marketing hogs in increased numbers at weights too light to qualify as

*Kidd, J. D. F., Canada Dept. of Agr., Ottawa, Ontario, Canada. Information on Canadian deficiency payment program. Private communication. 1961.

grade A or B, in an effort to market as many hogs as possible before the end of the direct purchase program.

The Associate Director of the Livestock Division, Canada Department of Agriculture, made an appeal to producers for an orderly change over to the deficiency payment program in December 1959 (14). Producers were told that clogging markets would mean delayed slaughter and unnecessary shrinkage, the government quality bonus would not be paid for hogs too light to grade A or B, and that lightweight hogs are subject to a packer discount of about \$3.50 per hundredweight below that paid for grade A hogs.

Marketings during the first week of January exceeded the slaughtering capacity of most plants and some hogs had to be carried over for slaughter into the next week (8, p. 11).

Estimating the effect of the deficiency payment program on marketings is difficult. The marketing figures available are fragmentary and some are of a preliminary nature. Farrowings were down 7 percent during June through August of 1959 as compared to the same period in 1958 (7, p. 11). This reduction in farrowings occurred before the formal announcement that in October 1959 by the Canadian Department of Agriculture that direct purchase of pork would end January 9, 1960. There were earlier announcements, however, that the direct purchase program would be replaced as soon as feasible by a direct payment program. A December 1959 survey of pigs

on farms showed a smaller percentage decrease than is normal for the cyclical downturn, according to past relationships (8, p. 12).

Marketings in 1960 declined considerably from 1959 cyclical peak levels. Preliminary estimates for the first 3 quarters of 1960 indicated declines of 10 percent, 14 percent and 31 percent respectively, in average weekly slaughter as compared to the same quarters in 1959 (9, p. 10). An estimate derived from a June 1, 1960 survey of pigs on farms indicated a 27 percent decrease in average weekly marketings for the last quarter of 1960 as compared to 1959.

The downturn in marketings during 1960 allowed the Agricultural Stabilization Board to dispose of much of the surplus cold storage stocks accumulated under the direct purchase program. Domestic disappearance and exports during the summer months of 1960 exceeded market supplies (10, p. 14). Cold storage stocks were 26 million pounds at the end of July compared with 50 million pounds at the beginning of May and 72 million pounds at the same date a year earlier. Cold storage stocks were reduced to normal operating levels at the end of the summer.

With the beginning of the deficiency payment program there was some concern about increased Canadian pork exports to the United States. There was a probability that the United States would impose countervailing duties on pork

imports from Canada with the beginning of the direct payment program (7, p. 12). In an effort to prevent a countervailing duty from being enacted the Canadian government imposed an equalization fee which would compensate for any subsidies that would be paid under the deficiency payment program. This removed the subsidy from some Canadian exports to the United States. Exports to the United States of primal cuts or products of primal cuts from hogs eligible for deficiency payments may be exported only under a special export permit which is issued only on payment of the equalization fee. Exports of other pork products are made on an open permit and are not subject to the equalization fee. The equalization fee export provision went into effect January 25, 1960.

The reaction of producers to the program

Officials of the Canadian Government met a considerable amount of opposition from producer groups when they announced that the direct purchase method of support would be replaced by direct payments. Large scale producers complained that they--the most efficient producers--were unfairly discriminated against by the limit of payments provision. Contracting firms and large scale producers had expanded feeding and raising facilities assuming that the direct purchase program would continue.

The direct purchase program, while in effect in 1958 and

1959, guaranteed most large scale producers that hog prices would not decline below their production costs. Support levels had been set on the basis of costs of production. As mentioned earlier, the support price was set at \$25.00 per hundredweight at Toronto for 1958. This support level was in effect until October 1, 1959, after which it was lowered to \$23.65 at Toronto.

Under the direct payment program the large scale producers could receive subsidies for only 100 hogs. Many large scale producers and contracting firms planned cutbacks or withdrawals from hog production after the details of the direct payment program became known.*

At the outset small scale producers complained because their immediate returns would be low. Those who marketed hogs early in 1960 feared that a price rise later in the year would raise the grade A average price above the support level and no direct payment of any size would be made.

The fact that direct payments would be made only at the end of the year was disliked by many producers. There were demands for interim payments early in 1960. The price increases associated with the lower hog marketings during 1960 decreased the demands for interim payments.

*Rackham, T. S., Dept. of Econ. and Soc., Iowa State University of Science and Technology, Ames, Iowa. Information on effects of Canadian deficiency payment program on marketings. Private communication. 1961.

Some producers found it difficult to understand the operations of the program. Among these were producers who thought they could receive no payments if they sold hogs at prices above the support level. Others thought that if they sold hogs at any price below the support level, the difference, no matter how large, would be made up by the government.

Possible Adaptations to a Direct Payment Program for United States Producers

The Canadian deficiency payment program has three primary characteristics. These are: (a) the use of a moving average base price, (b) the limit of payments provision designed to improve the quality of hogs marketed and to reduce program costs, and (c) the provision for making the payments on an annual basis.

These features are discussed in the order presented, and an appraisal is made of their applicability for a direct payment program for United States producers.

A moving average base price

A moving average base price has some characteristics that tend to make it superior to parity as a method of establishing a support level. Parity prices are affected by economic conditions that existed in the distant past. Parity prices

also tend to overvalue some commodities relative to others, although this effect has been reduced by the institution of "modernized parity" (21, p. 696). Technology has generally contributed more to cost reduction in the production of crops than in livestock. The result has been an overvaluation of certain crops such as cotton and wheat. A moving average base price would embody more recent economic relationships than parity prices.

A shorter base period than used by the Canadians could be used. The shorter moving average, however, would be affected to a greater extent by periods of large or small marketings. For example, 1 year of very small marketings could cause a sizeable increase in a 4 year moving average base price.

Limit of payments

A limit of payments provision designed to improve the quality of hogs marketed would be difficult to incorporate in a direct payment plan for United States hog producers. Some hog buyers find it difficult to estimate accurately the grade and value of the pork cuts a hog will yield when slaughtered. Some undervaluation and overvaluation of hogs occurs with the live animal grading system. As a result, slaughter hogs of the same class and within the same weight range usually sell at about the same price per hundredweight

(20, p. 51). The grades used by different meat packers also vary. An improved, standardized live animal grading system or a carcass grading system would seem to be necessary before payments could be limited to producers of high quality hogs in the United States, in order to permit accurate identification of those hogs.

Payments could be made in proportion to need rather than in proportion to the number of hogs sold if payments were limited to a maximum number of hogs per producer. Large subsidies to producers with more than adequate incomes without additional government aid could be eliminated. The limit of payments provision could also discourage large scale producers and serve as a subsidy to inefficiency.

Payment procedure

The annual payment procedure has administrative and economic advantages. Administrative expense is lessened by making only one payment to each producer at the end of the year. The problems involved in setting seasonally adjusted base prices do not occur. Producers are induced to get the maximum price for each hog sold. The program provides no incentive for producers to increase marketings during periods of heavy seasonal marketings to reduce production costs.

The annual procedure adopted for making the direct payments, although administratively less expensive than making

interim payments, was disliked by some Canadian producers. They did not like the idea of waiting 1 to 12 months for direct payments they were not sure they would receive. Price uncertainty also remains when the payment size is determined by the difference between the weighted average market price and the support price for the entire year.

The procedure used by the Canadians for making the direct payments could be adapted to a direct payment program for United States producers. A variation of this type of payment determination is currently used in the direct payment program for wool producers. Under the wool program, each producer receives the percentage required to increase the national average wool price per pound up to the incentive level--\$.62 per pound--at the end of the marketing year (36, p. 17). A program that would provide payments after every week or month, if the average market price dropped below the support level, might be better liked by producers. If the weekly or monthly prices were announced a sufficient time in advance, price uncertainty could also be lessened to a greater degree and greater efficiency in resource allocation could be facilitated.

Features of the Canadian program are used in the alternative direct payment programs for United States producers considered in the following chapters. Some of the features are used without change; others are modified in an attempt to fit them to the objectives of the individual programs.

ESTIMATED EFFECTS OF LIMITING DIRECT PAYMENTS TO
A MAXIMUM NUMBER OF HOGS PER PRODUCER

The first program considered is a direct payment program for United States producers that would limit payments to a maximum number of hogs per producer. Such a program might be instituted if the government desired to encourage smaller producers--to give assistance more in line with need--in preference to large scale producers, or it could be an economy measure to stretch a limited appropriation to provide some assistance to all hog producers. This type of program could also be used to encourage a particular size enterprise or in an attempt to redistribute income among producers.

The programs examined are similar to the Canadian programs, with the exception of the quality restriction on payments. No attempt is made to estimate the effects of restricting payments to producers of high quality hogs.

In the study, estimates are made of the effects of alternative sizes of limits that might be imposed. Estimates are made of the percent of producers who could have had their entire hog sales subsidized, and the percent of volume that could have been subsidized under alternative limits to obtain estimates of the extent of program coverage.

A cost comparison is made between a program that would provide direct payments for all hogs and programs that would

limit payments to a maximum number of hogs per producer to estimate the reduction in program cost that the government might realize by imposing a payment restriction. An estimate is made of the effects on the distribution of income among producers of a limit on the size of payments to producers. The final part of the study is concerned with an estimation of some of the possible subsequent effects of limiting payments to a maximum number of hogs per producer.

All estimates are based on 1954 figures since this was the last year for which the needed Census data were available at the time of the study. All programs considered assume 100 percent producer participation.

Estimated Effects of Alternative Size Limits

The size of the limit imposed would depend upon the objectives of the program. If only very limited funds were available the government might, rather than reduce the support price, limit payments to 100 hogs per producer or less. The government might desire to encourage a particular size of enterprise and allow payments for no larger enterprise.

The effects of two alternative size limits are estimated-- a 100 hog limit and a 200 hog limit. Smaller size limits could have been considered, but a preliminary investigation indicated that the smaller limits would have been highly restrictive.

It is hypothesized that a limit on the size of payments would have different effects on the different areas of the country. Areas with generally small hog farms would have a higher proportion of sales eligible for subsidy. The effects of limiting payments are estimated on a regional basis to test this hypothesis. The following section involves an estimation of the percent of producers in the various regions that would have had their entire sales subsidized under the alternative limits.

Percent of producers completely subsidized

The 1954 Agricultural Census gives the number of producers who sold less than 100 hogs and less than 200 hogs and the total number of producers in each region (42, p. 505). Estimates of the percent of producers who could have had their entire sales subsidized under the 100 hog and 200 hog limit of payments provisions were computed from these figures. These estimates are shown for the nine Agricultural Census regions and for the United States in Table 2.

A considerable amount of variation in the size of enterprise existed between the regions. A high percent of the producers in the South Atlantic region were small scale producers; 98.07 percent marketed fewer than 100 hogs in 1954. By contrast, 81.92 percent of the producers in the West North Central region sold fewer than 100 hogs. Nationally, 89.24

Table 2. Percent of producers with sales completely subsidized by region and for the United States under hypothetical limited direct payment programs, 1954^a

Regions and United States	<u>100 hog limit</u> Producers completely subsidized (percent)	<u>200 hog limit</u> Producers completely subsidized (percent)
New England	92.83	95.76
Middle Atlantic	97.48	98.90
East North Central	84.17	94.91
West North Central	81.92	95.95
South Atlantic	98.07	99.50
East South Central	98.26	99.60
West South Central	98.60	99.60
Mountain	97.20	99.17
Pacific	93.17	97.08
United States	89.24	97.03

^aComputed from (42, p. 505).

percent sold fewer than 100 hogs and 97.03 percent sold fewer than 200.

With payments limited to 100 hogs per producer, over 98 percent of the producers in the three Southern regions could have had their entire sales subsidized. A 100 hog restriction on the size of payment would have had the least un-

favorable effect on these producers. A program that would have allowed payments for a maximum of 200 hogs would have permitted complete subsidization for over 95 percent of the producers in all regions, except the East North Central, and even there the percentage would have been 94.91.

Percent of volume subsidized with limited payments

The estimates given in Table 2 show that 89.24 percent of the producers in the United States could have had their entire sales subsidized under a 100 hog limit, and that 97.03 percent of the producers could have had their entire sales subsidized if payments had been made for a maximum of 200 hogs. Estimates are next made of the number and percent of hogs that could have been subsidized under the alternative limits.

Here again, the only estimates that are made are on the basis of 1954 figures. For the 100 hog limit, the number that would have been eligible is the sum of the marketings from producers selling fewer than 100 hogs per year, plus 100 hogs each from producers selling over 100 hogs. Under the 200 hog limit, the number eligible is the sum of the marketings of producers selling less than 200 hogs, plus 200 hogs from each producer marketing over 200.

The data available permit only rough approximations of the number of hogs that could have been subsidized with

limited direct payments. The 1954 Agricultural Census lists the number of producers who sold 1-4, 5-9, 10-14, 15-19, 20-29, 30-39, 40-49, 50-99, 100-199 and 200 hogs and over (42, p. 505). These figures are listed along with the total hog sales for each state, region and for the United States. The number of hogs sold by producers in each class is not given. The Deputy Director of the Bureau of the Census* said that it would be very costly to determine the number marketed by producers in each of these classes, and suggested a procedure which the Census Bureau has used to approximate the totals within each class. He suggested using the mid-point in each class to approximate the mean sales of producers in each interval. The mid-points could then be multiplied by the number of producers to estimate the total sales of producers in each sales class.

The Census Bureau processed data cards for 23 of the 99 counties of Iowa to see how closely the class mid-points corresponded to the mean number of hogs sold. Table 3 gives the estimated mean hog sales within each sales class by producers in the 23 counties.

These figures indicate that the mid-points would have estimated the means in the lower sales classes fairly

*Ecker, A. R., U. S. Bureau of the Census, Washington, D. C. Information on size of hog enterprises. Private communication. 1960.

Table 3. Estimated mean sales by hog producers in 23 Iowa counties for the various sales classes, 1954^a

Sales class (number of hogs sold)	Mean sales
1-4	2.6
5-9	6.9
10-14	11.6
15-19	16.8
20-29	23.6
30-39	33.8
40-49	43.4
50-99	71.1
100-199	137.3

^aEckler, A. R., U. S. Bureau of the Census, Washington, D. C. Information on size of hog enterprises. Private communication. 1960.

accurately. The figures also indicate that the mid-points would have overestimated the means in the higher sales classes.

An attempt was made to approximate the total sales in the upper classes by graphing the distributions since the mid-points might overestimate the means. Wayne Fuller*

*Fuller, W. A., Dept. of Stat., Iowa State University of Science and Technology, Ames, Iowa. Statistical consultation. Private communication. 1961.

was consulted in this undertaking. Histograms were constructed for a number of the state sales distributions, and the distributions were approximated with smooth curves. Efforts were made to measure the area of the curves beneath the upper sales classes to approximate the total sales in each class.

Some of the state sales class distributions were very irregular. Fitting the smooth curve became highly arbitrary. It was decided that the use of the mid-point to estimate the mean sales in each class would probably give greater accuracy than the graphic estimations.

An approximation was made of the number of hogs that would have been eligible for subsidy under the hypothetical direct payment programs limiting payments to 100 hogs per producer and to 200 hogs per producer. The estimation procedure is outlined for the 100 hog payment restriction only, since the procedure is very similar for the 200 hog payment limit.

The mid-points were multiplied by the number of producers in each class below the 100-199 level. These products were summed to estimate the total marketings of producers selling less than 100 hogs. The estimated marketings of producers selling less than 100 hogs were added to the hogs eligible for payments from producers selling over 100 hogs to estimate the total number of hogs that would have been eligible for payments.

The remaining hogs were assumed ineligible for direct payments.

This procedure was used to estimate the number of hogs that would have been eligible for direct payments from all states, except Iowa. The means provided by the Census Bureau for the 23 counties of Iowa were used as estimates of the class means for the entire state.

Table 4 shows the total hogs sold and the estimated number and percent of hogs eligible for direct payments under the limited payment programs. The estimates are given for each region, Iowa and the United States. For the United States the estimated number of hogs eligible for direct payments is the sum of the regional totals. Iowa estimates were included separately because of the state's relative importance in hog production. The Iowa estimates are also included in the West North Central approximations.

For the United States the estimated percent of hogs sold in 1954 that could have been subsidized under a direct payment program with a 100 head limit is 80.17 percent. The regional figures indicate that a 100 hog limit of payments would have had the least unfavorable effect on producers in the Southern regions. The approximate figures indicate that over 95 percent of the hogs sold in these regions would have been eligible for direct payments under the program with the 100 hog payment restriction. Producers in the New England

Table 4. Total hogs sold, estimated number and percent of hog eligible for subsidy under hypothetical limited direct payment programs, 1954

Area	Total hogs sold	100 hog limit		200 hog limit	
		Number eligible	Percent eligible	Number eligible	Percent eligible
New England	154,724	75,018	48.49	97,060	62.73
Middle Atlantic	901,333	703,062	78.00	740,967	82.21
East North Central	19,098,663	14,483,203	75.83	17,783,855	93.12
West North Central	28,667,737	22,685,236	79.13	26,958,832	94.04
South Atlantic	3,665,380	3,574,203	97.51	3,613,698	98.59
East South Central	2,898,591	2,840,441	97.99	2,853,373	98.44
West South Central	1,712,700	1,640,222	95.77	1,676,638	97.89
Mountain	631,514	500,944	79.32	528,815	83.74
Pacific	799,716	420,045	52.57	510,180	63.80
Iowa ^a	14,344,666	10,000,100	69.71	12,993,142	90.58
United States	58,530,358	46,922,374	80.17	54,763,418	93.56

^aAlso included in West North Central estimates.

and Pacific regions would have had a considerably smaller percent of their hogs eligible--only about 50 percent. Apparently the large scale producers in these regions marketed a major portion of the hogs. Producers in the East North Central and West North Central regions would have had about 75 percent of their sales eligible for direct payments. The number of hogs that would have been excluded from payments from these regions, however, is greater than for the other regions combined.

A direct payment program that would have limited payments to 200 hogs per producer would have allowed payments for an estimated 93.49 percent of the hogs sold in 1954. A 200 hog limit provision would have been considerably less restrictive on producers in the East and West North Central regions. It would have allowed payments for approximately 94 percent of the hogs sold in the West North Central region, the most important hog producing region. For the United States an estimated 7,841,044 more hogs would have been eligible for direct payments if payments had been made for a maximum of 200 hogs per producer, rather than 100.

It is fully realized that the estimates of the number and percent of hogs eligible for payments are rough approximations. They do, however, provide general estimates of how limits on the number of hogs eligible for payments might affect producers in the different areas of the country.

A Cost Comparison between Limited and Unlimited

Direct Payment Programs

A direct payment program that would provide payments for all hogs would make it possible for producers in all regions to get a greater subsidy than if limits were placed on the size of payments to individual producers, if the payment per hundredweight were the same under both programs. The previous estimates indicate, however, that as a group the producers in the Southern regions would have had the best relative position if payments had been restricted. A greater portion of their hogs would have been eligible for payments.

Three hypothetical direct payment programs are constructed and estimates are made of the cost to the government under each program. The first program is constructed with no limits on the size of payments to individual producers, i.e., all hogs are assumed eligible for direct payments. The size of these payments is compared with those made under programs containing restrictions that limit payments to 100 and 200 hogs per producer.

Estimating the unlimited payments

A hypothetical direct payment of \$2.00 per hundredweight is made for all hogs sold under the program that would provide unlimited payments. A payment of this size would have been made if the government had decided to increase the national

average price of hogs by \$2.00 per hundredweight, using an annual payment procedure. The \$2.00 per hundredweight payment is chosen merely for purposes of illustration. No subsidies would have been likely during a year when hog prices were as high as in 1954, unless the objectives of the program required that payments be made during times of both high and low prices.

The average weight of hogs commercially slaughtered within each state in hundreds of pounds (38, p. 326) was multiplied by \$2.00 to estimate the average direct payment per hog. Total payments for producers in each state were estimated by multiplying the average payment per hog by the number of hogs sold (42, p. 505). This procedure was used to estimate the hypothetical payment totals for producers in all states.

Regional payment totals were estimated by adding the payments that would have been made to producers in each of the states within the regions. The regional payment totals are shown in Table 5 along with payment totals for Iowa and the United States.

The estimate of the total payment in Table 5 shows how much it would have cost the government to give producers an arbitrarily selected payment per hundredweight. The estimate has greatest significance as a comparative device. It allows a percentage cost comparison between limited and

Table 5. Allocation of the unlimited direct payments

Area	Payment	Percent of payment
New England	\$ 764,337	.27
Middle Atlantic	3,924,831	1.37
East North Central	93,917,113	32.79
West North Central	145,169,210	50.68
South Atlantic	15,180,050	5.30
East South Central	13,160,176	4.59
West South Central	7,714,952	2.69
Mountain	2,922,697	1.02
Pacific	3,686,166	1.29
Iowa	73,444,690	25.64
United States	286,439,532	100.00

unlimited direct payment programs. It also allows an investigation of the effects of differences in marketing weights upon the regional allocation of the direct payments.

Estimating the limited payments

The effects of limiting the size of payments were next estimated. Payments were made in proportion to the number of hogs eligible for direct payments from each state. Payment size is again a flat \$2.00 per hundredweight. Average

payments per hog are the same as under the program that would have allowed direct payments for all hogs. The only difference between the programs is that the average payment per hog for producers in each state is now multiplied by the number of hogs eligible for direct payments, rather than by all hogs. It was assumed that the average weight of the subsidized hogs would have been the same as for all hogs commercially slaughtered within each state.

Table 6 gives the payments allotted to producers in each region, Iowa and the United States under the program that would have limited payments to 100 hogs per producer.

Table 6. Allocation of limited direct payment--payments limited to 100 hogs per producer, 1954

Area	Payment	Percent of payment	Percent of unlimited payment
New England	\$ 370,589	.16	48.48
Middle Atlantic	3,085,959	1.35	78.62
East North Central	71,076,502	31.10	75.68
West North Central	114,751,351	50.20	79.05
South Atlantic	14,794,358	6.47	97.46
East South Central	12,888,568	5.64	97.94
West South Central	7,388,780	3.23	95.77
Mountain	2,300,110	1.01	78.80
Pacific	1,917,481	.84	52.02
Iowa	51,200,510	22.40	69.71
United States	228,573,598	100.00	79.80

Limiting payments to 100 hogs per producer would have reduced the cost of the program by an estimated \$57,865,934, a reduction in payments of about 20 percent. Producers in the regions with the highest percentage of hogs eligible would have received a greater percent of the total payment under the program that would have limited payments to 100 hogs per producer. The percentage increase, however, would not have been large. Producers in the South Atlantic region would have received 5.30 percent of the national payment under the program imposing no size of payment restriction. These producers would have received an estimated 6.47 percent of the national payment under the program restricting payments to 100 hogs per producer. Producers in the East South Central region would have received 1.05 percent more of the total payment under the program imposing a 100 hog limit, as compared to the program allowing payments for all hogs.

The payments to producers in the New England and Pacific regions would have been only about half as great with the 100 hog payment restriction. Although only about 7 percent of the producers in the New England region sold over 100 hogs, these producers sold over 50 percent of the hogs. The figures in column 3 are highly correlated with the estimated percent of hogs eligible for direct payments from each region. The deviation from these figures can be attributed to the difference in average payments per hog. For example,

producers in the Mountain region sold their hogs at lighter weights, making their average payment per hog less, and consequently received slightly less of the national direct payment than their percent of eligibility would suggest. The regional differences in marketing weights, however, had very little effect on payment allocation.

Table 7 gives the payment details for the hypothetical direct payment program with a 200 hog payment restriction.

Table 7. Allocation of limited direct payments--payments limited to 200 hogs per producer, 1954

Area	Payment	Percent of payment	Percent of unlimited payment
New England	\$ 479,476	.18	62.73
Middle Atlantic	3,246,296	1.21	82.71
East North Central	87,368,508	32.63	93.03
West North Central	136,452,417	50.96	94.00
South Atlantic	14,960,710	5.59	98.55
East South Central	12,925,780	4.83	98.22
West South Central	7,552,822	2.82	97.90
Mountain	2,434,544	.91	83.30
Pacific	2,333,308	.87	63.30
Iowa	66,524,887	24.85	90.58
United States	267,753,861	100.00	93.77

The total payments under this program would have been \$267,753,861, or an estimated \$18,685,671 less than the required payments for the program that would have allowed payments for all hogs. The payments would have been about 6 percent smaller than the payments required to subsidize all hogs.

The cost of the program that would have allowed payments for 200 hogs per producer would have been \$39,180,263, or an estimated 17.40 percent greater than the program that would have limited payments to 100 hogs per producer. A large part of the increase in total cost can be attributed to the greater payments that would have been required for producers in the North Central regions. Total payments to producers in these regions would have been an estimated \$37,993,072, or 16.97 percent higher with payments for 200 hogs per producer.

Estimated Effects of Limiting Payments on the Distribution of Income

Many of our commodity programs were originally designed to stabilize producer incomes. Under these programs the income supplements received by producers have been directly proportional, or nearly so, to the number of units sold. Large scale producers have received large subsidies, small scale producers small subsidies. The objective of the programs has been to stabilize individual producer incomes,

rather than to redistribute the income.

A program that contains a provision that limits the size of payments to individual producers would function to bring about a redistribution of income among producers. Small scale producers would receive subsidies on each unit of their total sales. The high volume producer, who produces in excess of the limit, would receive subsidies for only a portion of his sales. A substantial redistribution of income would be expected if the payments constituted a major part of the value of each unit sold.

In the following analysis an estimate is first made of the distribution of the gross income from hog sales among Iowa producers in 1954. A hypothetical direct payment program providing direct payments for a maximum of 100 hogs per producer is introduced, and the payments provided by the program are added to the incomes of producers and the distribution of income is re-estimated. A measurement is made of the change in the distribution of income that would have been caused by a limited direct payment program. The 100 hog limit was selected for investigation because it was thought that the greatest effect on the distribution of income would be caused by the most restrictive limit.

The distribution of income estimates are made with Iowa figures only. A direct payment program with a 100 hog limit of payments provision could be expected to have the greatest

effects in states with a high proportion of large scale producers such as in Iowa. The methods used in estimating the effects in Iowa can be applied to other states with a high proportion of large scale producers.

Estimating the distribution of income

Iowa producers were classified by size of enterprise in the income distribution estimation. Each one of the Agricultural Census producer sales classes was considered a separate group of income recipients. For example, the producers who sold 1 to 4 hogs were classified as the lowest hog income group. Producers who marketed 200 hogs and over constituted the highest hog income group.

Estimates of the total hogs sold by producers within each class were made using the means provided by the Census Bureau. Total hog sales by producers in each class were estimated by multiplying the means by the total number of producers. The total income received by producers in each class was estimated by multiplying the number of hogs sold by the Iowa average price received per hog in 1954. This average price is the product of the average price received by farmers per hundred-weight (38, p. 341) and the average weight of hogs commercially slaughtered (38, p. 326).

Some error could occur as a result of the assumption that the hogs marketed by producers in each class would have had

average values equal to the state average. The number of hogs sold by producers in each group ranged from an estimated 9,805 to 4,429,924. These are fairly large samples, however, and as a group, the hogs sold by producers in each class could be expected to have average values close to the state average.

Iowa hog producers received an estimated total income of \$771,169,244 from hog sales in 1954. Table 8 shows how this income was distributed among the various producer groups. Table 8 also gives the estimated average incomes of producers in each class and the percent of producers in each sales class.

The figures show the extent of the inequality in the distribution of income from hog sales. Producers who marketed 1 to 4 hogs made up 2.45 percent of the producers and received an estimated .07 percent of the income. Producers with sales of 100 to 199 hogs got the largest share of the income. This group constituted 25.37 percent of the total and received an estimated 37.31 percent of the income. Producers who sold over 200 hogs made up about 10 percent of the total and received nearly 31 percent of the income. The cumulative percentage figures indicate that approximately 10 percent of the small volume producers received less than 1 percent of the income.

Estimated redistribution caused by limiting direct payments

An attempt was made to estimate how the distribution of income would have been affected by a limited direct payment

Table 8. Estimated average incomes per producer for the various sales classes and the distribution of income among producers in Iowa, 1954

Sales classes (hogs per year)	Average income per producer	Percent of producers	Percent of income	Cumulative percent of producers	Cumulative percent of income
1-4	\$ 140	2.45	.07	2.45	.07
5-9	371	3.43	.25	5.88	.32
10-14	624	3.68	.46	9.56	.78
15-19	903	3.52	.63	13.08	1.41
20-29	1,269	7.34	1.65	20.42	3.26
30-39	1,817	7.29	2.64	27.71	5.90
40-49	2,333	7.37	3.43	35.08	9.33
50-99	3,822	29.52	22.48	64.60	31.81
100-199	7,361	25.37	37.31	89.97	69.12
200+	15,473	10.03	30.88	100.00	100.00

program. A hypothetical \$2.00 per hundredweight direct payment was made for each hog sold by producers who marketed less than 100 hogs. Producers who marketed over 100 hogs received the same payment, but for only 100 hogs. It was assumed that the hogs marketed by producers in each class would have had average weights equal to the state average, 256 pounds (38, p. 326). Each group of producers would then have received an average payment of \$5.12 for hogs eligible for direct payments.

The addition of the hypothetical subsidy would have raised the gross hog incomes of Iowa producers by an estimated \$51,200,510, or approximately 6.64 percent. Table 9 shows the distribution of income after adding the hypothetical subsidy. The distribution of income would have been changed very little. Producers with sales of less than 100 hogs would have received a slightly greater percent of the income. Producers who sold 200 hogs and over would have received about 1 percent less of the total income. The average incomes of producers whose entire sales were subsidized would have been increased by a constant percentage, and the average incomes of producers in the two upper sales classes would have been increased by lesser percentages.

It is realized that some doubtful simplifying assumptions were made in the estimation processes. The hogs marketed by producers in the various sales classes may not have been as

Table 9. Estimated effects on per producer incomes and on the distribution of income of a hypothetical limited direct payment program

Sales classes (hogs sold per year)	Average income per producer	Percent increase	Percent of producers	Percent of income	Cumulative percent of producers	Cumulative percent of producers
1-4	\$ 153	9.52	2.45	.07	2.45	.07
5-9	406	9.52	3.43	.26	5.88	.33
10-14	683	9.52	3.68	.47	9.56	.80
15-19	989	9.52	3.52	.65	13.08	1.45
20-29	1,390	9.52	7.34	1.91	20.42	3.36
30-39	1,990	9.52	7.29	2.71	27.71	6.07
40-49	2,555	9.52	7.37	3.52	35.08	9.59
50-99	4,186	9.52	29.52	23.09	64.60	32.68
100-199	7,893	6.94	25.37	37.40	89.97	70.08
200+	15,985	3.31	10.03	29.92	100.00	100.00

homogeneous as assumed. A general observation, however, may be drawn from this portion of the study. A short-run direct payment program, that would limit payments to a maximum number of hogs per producer, would not be likely to cause a redistribution of income of any significant magnitude among producer groups. The direct payments, though fairly large per hundredweight and providing a fairly large income supplement, would not have constituted a large enough portion of the value of each hog sold to cause a significant redistribution of income among producer groups.

A hypothesis might be advanced that a redistribution of income could occur in subsequent years after the enactment of a limited direct payment program. A large redistribution could take place if large scale producers were induced to cut back production while small scale producers expanded toward the maximum number of hogs eligible for payments under the program.

Possible Subsequent Effects of Limiting Payments

The previous estimates of the effects of restricting the size of payments to individual producers can be regarded as accurate only if it is assumed that the hypothetical programs were short-run measures. The estimates could be expected to approach reality for only the first year of the program's operation. Producers, given a sufficient amount of time,

could be expected to alter their production to adjust to a limited direct payment program.

Producer cost structures would be one of the factors that would influence the magnitude of the expansions or contractions in output. Economic theory suggests a possible production response by producers to a limited direct payment program. Figure 1 shows a hypothetical situation producers might face in making production decisions under a direct payment program that limits payments to a maximum of 100 hogs per producer. The example represents a situation where the support price is announced in advance.

The producer's marginal revenue curve is stepped. For the first 100 hogs sold the marginal revenue curve is the support price, and for sales exceeding this number the marginal revenue curve is the open market price at some lower level. MC_1 shows the hypothetical marginal cost curve of a producer who, before the limited direct payment program, sold fewer than 100 hogs. If this producer were guaranteed the support price, he would increase sales to 100 hogs to maximize profit. MC_2 shows the marginal cost curve of a producer who, before the program, marketed 100 hogs. This producer would receive a greater net return for his sales because of lower production costs, but it would not be profitable for him to expand production beyond the number of hogs eligible for payments. In this hypothetical case the less efficient

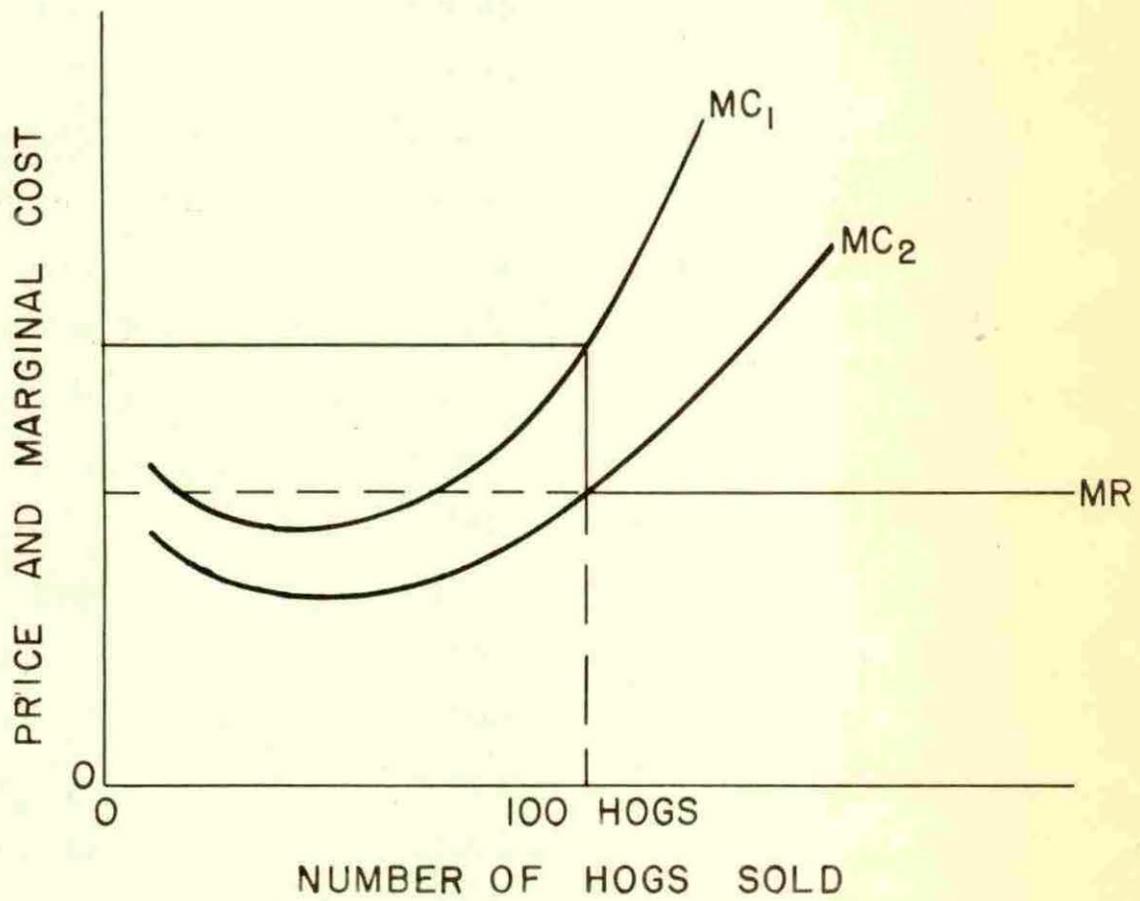


Figure 1. Production planning under a hypothetical limited direct payment program

producer is given an inducement to expand output while the more efficient producer would maintain his sales at pre-program levels.

Whether the producer who marketed more than the number of hogs eligible for payments would maintain his previous level of production, or reduce production, would depend upon his individual cost structure. Production in excess of the limit would be profitable if the marginal revenue from producing each hog in excess of the limit were greater than the marginal cost.

Estimates of the cost of production for various size enterprises are rare. Purdue University, however, published some data showing economies of scale in hog production (1). These have some value in estimating the possible subsequent effects of a limited direct payment program. In the Purdue study cost and returns for various size enterprises ranging from 5 sows to 120 sows were computed. Table 10 shows the summarized estimates of average costs and returns per hundredweight for 130 Indiana hog enterprises.

These estimates were computed from data collected during 1956 and 1957 from producers with herds of from 5 to 120 sows all on a two litter basis. The data were adjusted to a corn-hog ratio of 13.6 to 1--long time Indiana averages--with corn valued at \$1.21 per bushel and hogs at \$16.50, adjusted seasonally to reflect the average situation. Labor was

Table 10. Costs and returns per hundredweight for various size Indiana hog enterprises^a

Number of sows	Cost per hundredweight	Net return per hundredweight
5-14	\$16.86	\$.03
15-24	15.62	.81
25-34	15.78	1.09
35-44	14.86	1.91
45-54	14.56	2.03
55-64	14.50	2.20
65+	15.21	1.62

^aData from (1).

charged at \$1.00 per hour for all enterprises.

Figure 2 gives an approximation of the average production costs per hundredweight expressed in number of hogs sold. These figures represent costs for a single season's farrowings. The estimates were computed by multiplying the average number of pigs raised per litter by the average number of sows farrowed from each group.

The cost estimates are too aggregated to be of great value, but they do indicate economies of scale. Costs of production per hundredweight averaged \$16.86 for the 5 to 14 sow herds and 14.50 for the 55 to 64 sow enterprises, a difference of \$2.36.

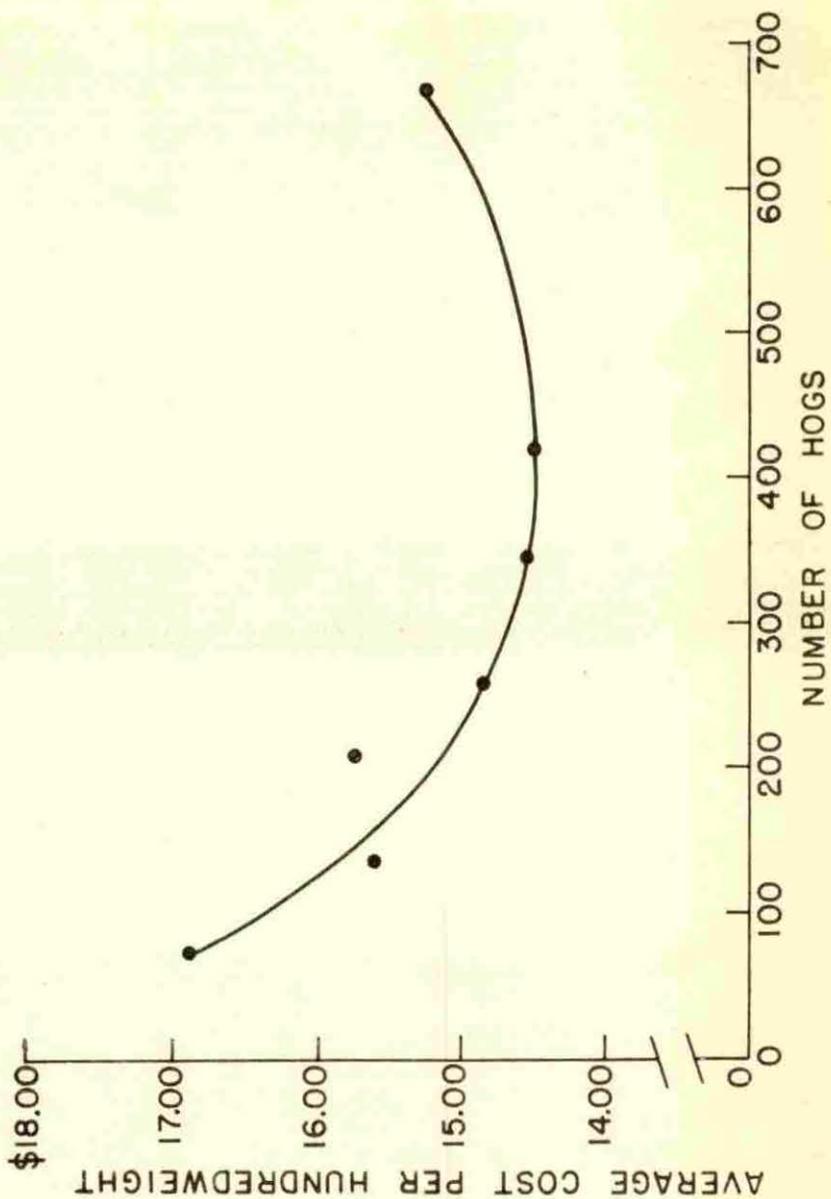


Figure 2. Cost of production by size of enterprise

The cost estimates indicate that neither a 100 hog nor a 200 hog yearly payment limit would encourage the most efficient size enterprise. The lowest average costs per hundredweight were realized with about 60 sows or with sales of between 350 and 400 hogs from a single season's farrowings.

It is also conceivable that the economies of scale could offset a sizeable direct payment given the small scale producer for his entire sales. Production in excess of the limit could be as profitable for the large scale producer as for the producer with small, entirely subsidized sales.

Several factors in addition to production costs would influence producer adjustments to a limited direct payment program. If the limited direct payment program effectively reduced price uncertainty and offered an attractive support price, a widespread expansion toward the maximum number of hogs eligible for payments would be expected.

Any expansion in output would be moderated by shortages of feed and hog raising facilities. Producer uncertainty about the continuance of the program might also affect expansion plans. A producer might be reluctant to expand his hog enterprise if there was a possibility that the program would be terminated with a change in administration.

The size of the limit would also be highly important. Small scale producers could be expected to account for most of the increases in production if payments were restricted

to 100 hogs per year. A more general expansion in production would be expected if payments were made for a maximum of 200 hogs, since so large a percent of the producers sold fewer than 200 hogs. Over 97 percent of the producers in the United States sold less than 200 hogs in 1954.

Potential increases in production

There are probably as many possible patterns of expansion as there are support levels, and any approximation of the magnitude of the expansions would be at best a thoughtful guess. An approximation can be made, however, of the potential increases in total production that would occur if small scale producers increased production moderately as a result of a limited direct payment program.

Estimates are made of the potential expansions under a direct payment program that would limit payments to 100 hogs per producer, since a 200 hog limit might allow quite a general expansion. No attempt is made to include in the estimates the producers who might add a hog enterprise to take advantage of the program. Estimates of the potential increases are made on a regional basis to show where the expansions might occur.

Columns 1 and 2 of Table 11 show the potential increases in hog production if:

- (a) Producers who market 1 to 4 hogs do not expand

production as a result of the program. It was assumed that these producers simply farrowed 1 sow for a farm meat supply. The hogs not consumed from the single litter are marketed.

(b) Producers who market from 5 to 99 hogs add an average of 1 sow.

(c) Producers who market over 100 hogs maintain production at pre-program levels. The economies of scale allow a maintenance of past levels of production, but the program does not induce these producers to expand output.

(d) An average of one half of all producers have two farrowings per year and each additional sow adds an average of 7 hogs to total marketings.

Columns 3 and 4 of Table 11 show the potential increase in marketings by small scale producers if producers who market 50 to 99 hogs add an average of 2 sows rather than 1. The other conditions are the same as for the more limited expansion in output. This might be a more realistic pattern of expansion, since these producers could be expected to have more elaborate hog raising facilities and a greater capacity to expand.

There would be an increase in marketings of about 11 million hogs under the first pattern of expansion and approximately 13 million under the second. The percent of the total increase contributed by producers in the regions would not be in proportion to their average contribution to

Table 11. Potential expansion in production under limited direct payment program^a

Regions and United States	Pattern 1		Pattern 2	
	Increase (number of hogs)	Percent of total increase	Increase (number of hogs)	Percent of total increase
New England	21,462	.19	23,478	.18
Middle Atlantic	291,648	2.64	312,053	2.37
East North Central	2,699,046	24.44	3,369,457	25.62
West North Central	3,822,819	34.62	4,985,232	37.90
South Atlantic	1,642,375	14.87	1,747,781	13.29
East South Central	1,369,872	12.40	1,451,303	11.03
West South Central	863,471	7.82	901,103	6.85
Mountain	206,059	1.87	222,201	1.69
Pacific	126,735	1.15	140,952	1.07
United States	11,043,487	100.00	13,153,560	100.00

^aBasic data from (42, p. 505).

total hog sales.

About 80 percent of the hogs marketed in the United States are sold by producers in the two North Central regions (37). Producers in the three Southern regions market an average of about 15 percent of the total hogs (37). The percent of the total potential increase in production by producers in the two North Central regions is about 60 percent, and by producers in the three Southern regions over

30 percent.

Effect on prices

Increases in hog production of these magnitudes would depress hog prices about 2.5 times as much in percentage terms as the percent increases in production. Thus, in a subsequent year, a larger direct payment per hundredweight would be required to maintain the previous level of support if small scale producers increased production in response to the program.

If this program had been instituted in 1954, and the first pattern of expansion had materialized, there would have been an increase in the volume of marketings of 18.63 percent from 1954 to 1955, and under the second pattern of expansion an increase of 22.19 percent. It was assumed that the additional hogs marketed would have had average weights equal to the 1955 national average, 237 pounds (39, p. 326).

The national average price received by farmers for hogs in 1954 was \$21.60 per hundredweight (34, p. 250). The addition of the hypothetical \$2.00 per hundredweight direct payment to the prices of the hogs eligible for payments under the 100 hog limit would have increased their prices to \$23.60 on the average.

Prices would have been depressed by an estimated 46.58 percent by an increase in the volume of marketings of 18.63

percent from 1954 to 1955. An increase in marketing volume of 22.19 percent would have depressed prices by an estimated 55.48 percent. Prices would have been depressed by an estimated \$10.06 per hundredweight by the increased marketings under the first pattern of expansion and by \$11.98 per hundredweight under the second. The elasticity of demand estimate that was used to compute the estimated price changes is -0.4 (28, p. 20).

The direct payment per hundredweight that would have been required to support eligible hogs in 1955 at the same level as in 1954 would have been \$12.06 per hundredweight if the first pattern of expansion had materialized, and \$13.98 per hundredweight if the second pattern of expansion had been realized.

Appraisal of the Limited Direct Payment Program

The cost of the limited direct payment programs considered would have been fairly high relative to the highest recent government expenditure for assistance to hog producers--\$101,000,000 in 1955. It would have cost the government an estimated \$228,573,861 for the program that would have limited payments to 100 hogs per producer, and \$267,753,861 for the program with a 200 hog limit. The hypothetical direct payment per hundredweight was \$2.00 for both programs. The cost estimates are not too meaningful,

because the direct payment per hundredweight was arbitrarily selected. However, even if the direct payment per hundredweight had been reduced to \$1.00 and program costs halved, the programs would have been more expensive than the government pork purchase program in 1955.

Perhaps the greatest significance of the cost estimates concerns relative costs. With a given level of support, program cost would have been reduced by about 20 percent by limiting payments to 100 hogs per producer. Restricting payments to 200 hogs per producer would have reduced the cost of the program by about 6 percent.

A direct payment program that limited the number of hogs eligible for direct payments from each producer could have adverse effects on production efficiency in subsequent years. The adverse effects would occur if small scale, less efficient producers reduced production as a result of the program.

The Purdue study showed differences in average cost of over \$2.00 per hundredweight for operators with 5 to 14 sow herds as compared to operators with 55 to 64 sow herds, and that the lowest costs in terms of hogs sold were realized with sales from a single season's farrowings of between 350 and 400 hogs. On the basis of this study, neither a 100 hog limit, nor a 200 hog limit, would encourage the most efficient size farm. The limit would have to include a greater number of hogs per producer to include the entire production

of the optimum size unit.

The Purdue study would suggest that the Nation's hogs would be produced at a greater resource cost if small scale producers were induced, by a limited direct payment program, to produce a greater percent of the hogs.

THE USE OF A LIMITED DIRECT PAYMENT PROGRAM TO
REDUCE PRICE UNCERTAINTY

The programs considered in the previous chapter limited payments to 100 or 200 hogs, from any slaughter class, per producer. The program considered in this chapter limits payments by another method. The objective here is to stabilize returns, not to raise them, and payments are for barrows and gilts; other slaughter classes are excluded from eligibility for direct payments. The present direct payment program is a type of program that might be used by the government to reduce price uncertainty.

Payments could be limited to barrows and gilts to reduce the cost of the program. The limit would be consistent with the objective of the program, since unexpected changes in the prices of barrows and gilts have the greatest effect on producers.

Some of the provisions of the Canadian direct payment program are modified and used in the program. Modifications were made in an attempt to remove some of the features that Canadian producers found objectionable. For example, some Canadian hog producers disliked the program because it provided for an annual determination of payment size and payment distribution. Canadian producers complained that, because of this feature, the program provided no effective

basis for production planning. They also had to wait for 1 to 12 months after marketing their hogs to see if they would receive direct payments. In the present program a weekly moving average base price is used to establish a different support price for each week to provide a forward price for planning purposes.

An estimate is made of the cost of the program providing weekly direct payments for barrows and gilts for 1956 through 1959. A cost comparison is made between this program and one that would provide for an annual determination of payment size. The payment limit imposed under this program is compared with the 100 hog and 200 hog limits in the programs of the previous chapter.

Price Uncertainty

Price uncertainty is undesirable from the producer standpoint largely for two reasons. (a) Efficient production planning is difficult when price movements are highly unpredictable. (b) Errors in producer price expectations cause large variations in marketings. The variations in marketings cause large variations in incomes. These are generally considered to be undesirable.

Production plans which determine the number of hogs to be raised and the combination of hogs and other enterprises must be made about a year before marketing time. Hog

producers projecting current price relationships into the future tend to underproduce following periods of unfavorable price relationships and overproduce following periods of favorable price relationships. Producers are unable to maximize ex post profits, and resources are not used most efficiently.

Errors in producer price expectations cause expansions and contractions in marketings which in turn cause large variations in the value of the hogs marketed. Table 12 shows the cash receipts from hog sales from 1954 through 1959 and the absolute and percentage change in receipts from the previous year.

If the government would announce a guaranteed minimum hog price a year in advance, much of the price uncertainty could be removed from hog production. This guaranteed minimum price could be incorporated into a direct payment base price with the support level announced a year before the marketing period for which it applied.

A Seasonally Adjusted Base Price

In most parts of the United States it costs less to raise spring pigs than fall pigs. The spring pig crop for the United States as a whole is usually about twice as large as the fall pig crop.

Table 12. Cash receipts from total United States hog sales 1954 through 1959, absolute and percentage change in receipts from previous year^a

	Cash receipts (1000 dollars)	Change (1000 dollars)	Percentage change
1954	3,454,542		
1955	2,709,258	-745,284	-21.57
1956	2,628,439	- 80,819	- 2.98
1957	3,090,159	461,720	-17.57
1958	3,418,577	328,418	10.63
1959	2,806,084	-612,493	-17.92

^aData from (34, 35).

When the spring pig crop reaches the market during the November to January period it depresses prices. These lower prices prevent still larger numbers of spring pigs from being raised.

If a seasonally flat base price were used, producers would be given an incentive to increase the production of spring pigs. Increased market congestion could be expected during the November through January period.

A different support price for each week or month incorporating the normal seasonal price movements of the past would reserve the seasonal price patterns that have developed over the years, representing a balancing of returns and costs

at different seasons of the year. Also producers could be given direct payments after every week or month if the average market price declined below the support level.

A direct payment program with monthly support prices would be simpler to administer than one with weekly support prices. The government would establish and announce 12 support prices rather than 52. Objections can be raised against the use of monthly support prices, however. A monthly support price might induce producers to hold hogs over for 1 or 2 weeks to take advantage of a higher support price the next month. Objections could also be raised by producers if sharp price changes occurred within a month. For example, if the program made up the difference between the average market price and the support price for a month, a producer who sold hogs early in the month, when prices were high, would get a substantially greater total return than the farmer who sold later in the month after a significant price decline.

Figure 3 shows the average percent of the yearly barrow and gilt marketings at the eight terminal markets* for each week and the average weekly prices for 1956 through 1959 (31). The price variations associated with the variations in

*The eight terminal markets are: Chicago, St. Louis, Kansas City, Omaha, Sioux City, South St. Joseph, South St. Paul and Indianapolis.

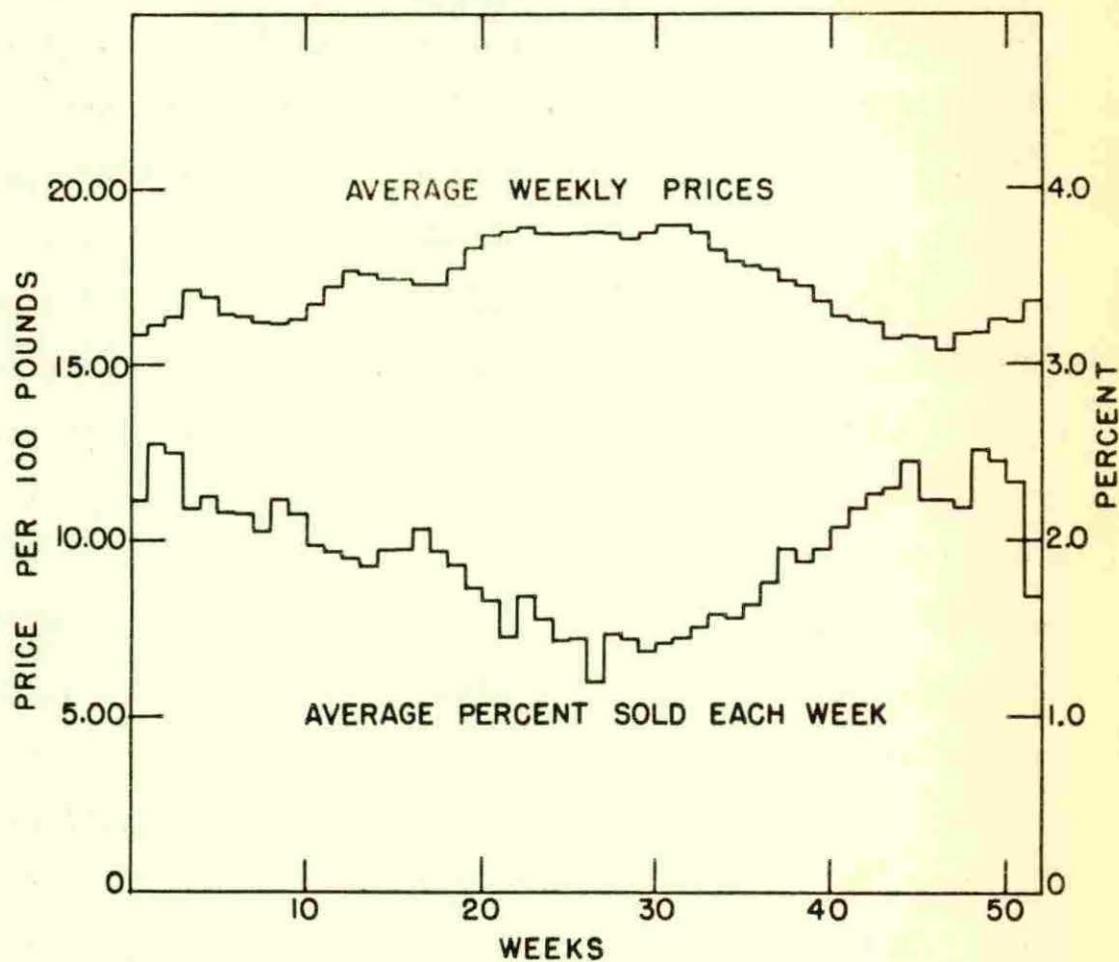


Figure 3. Average weekly barrow and gilt prices and the average percent marketed each week at the eight terminal markets, 1956 through 1959

marketings are fairly great within some months. It seems likely that weekly support prices would be needed to take this detailed price variation into account.

A weekly support price could be established at some percentage of the average weekly prices during a past period. The support prices would be simple to calculate and the weekly support levels could be determined and announced approximately a year in advance.

A long or short base period could be used to compute the weekly base prices. The base period would probably have to be at least 4 years long to average out the effects of the hog cycle. A 10 year moving average weekly base price, for example, might be criticized because some of the prices used in computing it were influenced by economic conditions too many years distant in the past. If fewer weeks were used to compute the moving average base price it would be affected to a greater extent by weeks of large or small marketings.

Operational Features of the Hypothetical

Direct Payment Program

In the following analysis estimates are made of the weekly payments that would have been made to United States hog producers under a hypothetical direct payment program for barrows and gilts. The program is simulated for the 4 year

period 1956 through 1959. The program has the following features:

(a) A 10 year moving average base price is used to establish the support price for each week. The support level for each week is set at 80 percent of the average price of barrows and gilts for the corresponding week for the previous 10 years. The 80 percent level is chosen because producers would be likely to respond more to guaranteed prices than to uncertain prices that averaged the same as the guaranteed prices. The incentive to increase production to take advantage of the guaranteed prices could be lessened by setting the support level below the average prices received during the base period.

(b) Payments are made for barrows and gilts only. A provision that would limit payments to producers of high quality hogs would be difficult to include in a direct payment plan for United States producers. However, it would not be difficult to exclude other slaughter classes from eligibility for payments. The program currently being considered has as a primary objective the reduction of price uncertainty. Most producers are primarily concerned with changes in the prices of barrows and gilts from breeding to marketing time. Payments could then logically be limited to these classes without greatly impairing the functioning of the program. A limit of payments provision such as this would also make possible some

reductions in Treasury costs.

(c) The direct payment per 100 pounds is determined by the difference between the weekly support prices and the open market prices at selected representative markets.

Computational procedure and assumptions

The base price for each week of the 4 year periods is computed by averaging the eight terminal market prices of barrows and gilts for the previous 10 years (30). The support price for each week is 80 percent of the base price. Weekly open market prices used in the hypothetical direct payment program are the average prices of barrows and gilts purchased at the eight terminal markets (31).

Commercial barrow and gilt slaughter estimates were used as a measure of the number of barrows and gilts that could have been subsidized under the program. It was necessary to compute an estimate of weekly commercial barrow and gilt slaughter since this series is not compiled by the Department of Agriculture. A related series, weekly federally inspected hog slaughter (34, 35), was adjusted to estimate these figures.

Each weekly federally inspected hog slaughter figure was multiplied by the ratio

$$\frac{\text{Monthly commercial hog slaughter}}{\text{Monthly federally inspected hog slaughter}}$$

to obtain an estimate of total weekly commercial hog slaughter. The weekly commercial hog slaughter estimates

were then multiplied by the estimated proportion of barrows and gilts (31) in the eight market hog run for the corresponding weeks to estimate the number of commercially slaughtered barrows and gilts.

Estimates were computed of the direct payments that would have been made for the weeks in which the support prices exceeded the market prices. An estimate of the total live weight of the barrows and gilts commercially slaughtered during each week was necessary to estimate the weekly payments. This estimate was obtained by multiplying the average weights (31) of barrows and gilts purchased at the eight markets by the estimated number of barrows and gilts commercially slaughtered each week. Weekly payments were then estimated by multiplying the difference between the support and the market price by the estimated weight of the barrows and gilts slaughtered.

In the calculation of the weekly direct payments, the average weight of barrows and gilts commercially slaughtered and the percentage of barrows and gilts in the hog run were estimated from purchase figures for the eight terminal markets. These figures were assumed to represent market composition and barrow and gilt weights for all commercial slaughter in the United States. They represent about a 20 percent sample of all commercial slaughter. These markets are also distributed throughout the major hog producing areas.

The eight terminal market prices were also used to compute the weekly support prices and to represent the national weekly market prices. A procedure analogous to the one used might be an administrative necessity if a direct payment program like the one simulated were actually put into operation. The Canadian Government, for example, averages the hog prices from selected markets only to determine the effective support and market prices.

It was assumed that production during the time the hypothetical direct payment program was in effect would have been the same as under the open market. This is obviously an unrealistic assumption. A program designed to reduce price uncertainty would be very likely to cause an increase in production. It is difficult, however, to estimate how much production would have increased with a guaranteed price set at 80 percent of the previous 10 year average.

In addition, producer participation in the program was assumed to be 100 percent.

Estimated Weekly Payments

Figure 4 shows the weekly support prices and the market prices of barrows and gilts and the estimated weekly payments for 1956 through 1959. Table 13 shows the summarized payments and the number and percent of commercially slaughtered barrows and gilts that would have been subsidized under the

Figure 4. Weekly market and support prices and the estimated weekly payments, 1956 through 1959

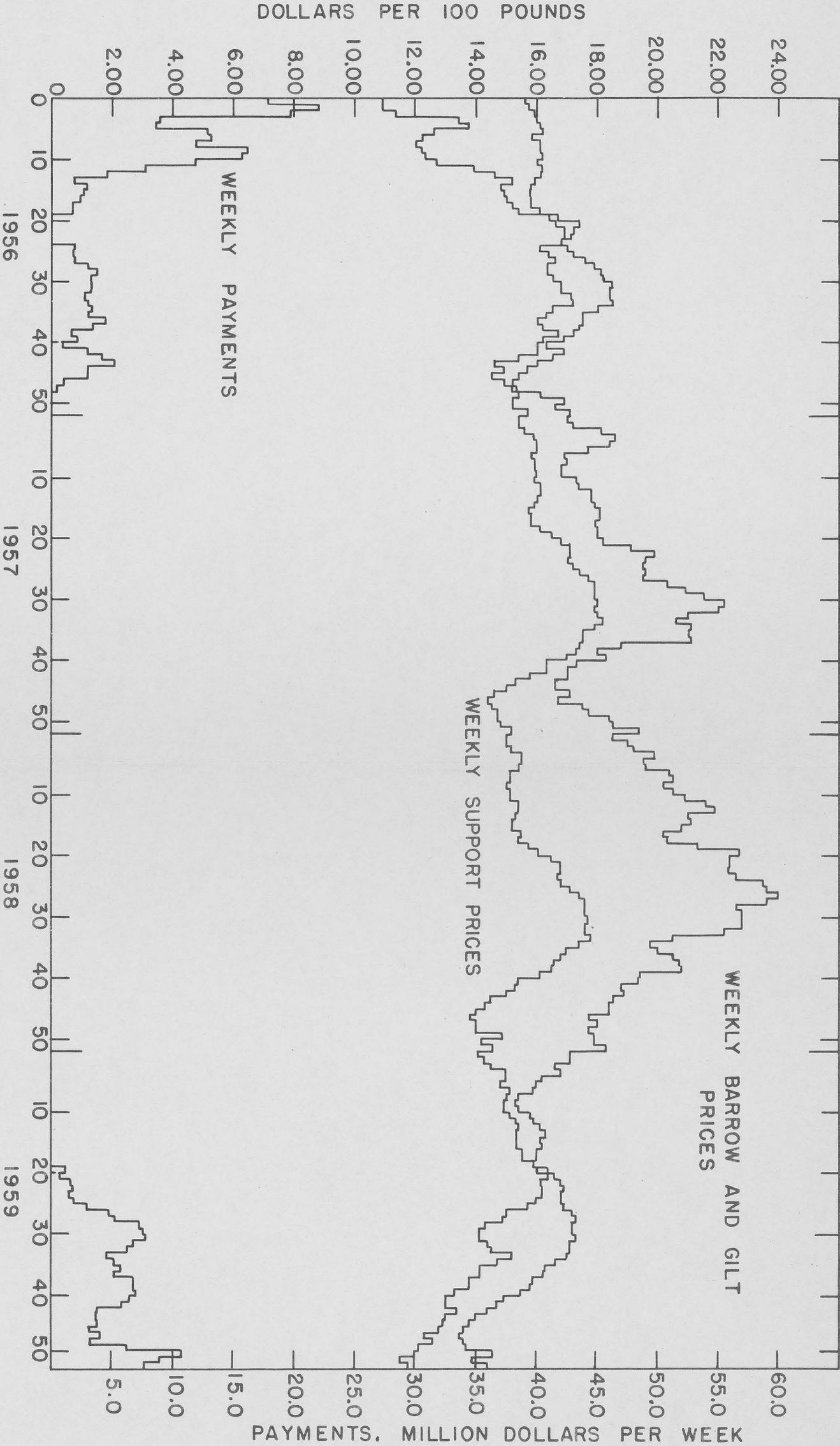


Table 13. Summary of payments, number and percent of commercially slaughtered barrows and gilts subsidized under the hypothetical direct payment program, 1956 and 1959^a

	1956	1959
Yearly payment total	\$249,020,380.00	\$166,953,322.00
High weekly payment	\$ 22,080,942.00	\$ 10,866,227.00
Low weekly payment	\$ 287,807.00	\$ 636,733.00
High payment per cwt.	\$ 4.78	\$ 3.18
Low payment per cwt.	\$.07	\$.23
Number subsidized	64,155,082.00	44,008,133.00
Percent subsidized	92.74	61.50

^aEstimates are shown only for weeks in which the support prices exceeded the market prices.

assumed direct payment program.

The size of the weekly support levels can be seen from Figure 4. A decline in the level of support can be seen over the 4 year period. For example, the high weekly support price for 1956 was \$18.54 per hundredweight for the 34th week and the low weekly support price was \$15.19 per hundredweight for the 50th week. For 1959 the high weekly support price was \$17.31 per hundredweight for the 28th week and the low weekly support level was \$13.47 per hundred pounds for the 47th week.

The decline in the level of support can be attributed to the inclusion of more recent prices in the computation of the moving average base price. In calculating the 1956 support prices, for example, the high post war hog prices of 1947 and 1948 were included. By 1959 these prices had been worked out of the moving average base price.

Under the hypothetical system of direct payments established for 1956, payments would have been made after 43 of the 52 weeks. Direct payments would have been made for an estimated 92.7 percent of the barrows and gilts. The remaining 7.3 percent were slaughtered during the 9 weeks when open market prices exceeded the support prices. The estimated payments ranged from a high of \$22,080,942 for the second week of 1956 to a low of \$287,807 for the 48th week. The second and 48th weeks would also have been the weeks of highest and lowest payments per 100 pounds. For the second week the subsidy would have been \$4.78 per hundredweight; for the 48th week \$.07 per hundredweight.

During 1957 a cyclical decrease in marketings occurred and market prices exceeded the hypothetical support prices for all weeks. Barrow and gilt prices reached a weekly high of \$22.19 per hundredweight during the 31st week and at this time exceeded the support level by \$4.19. Barrow and gilt marketings were again low in 1958 and no direct payments would have been necessary. Prices rose to a peak of \$23.58

per hundredweight during the 26th week, \$6.50 above the support price.

A cyclical increase in marketings began in 1959. Barrow and gilt prices dropped below the hypothetical support price after the 19th week and remained there for the rest of the year. During the weeks in which the support prices exceeded the market prices an estimated 44,008,133 barrows and gilts were slaughtered--61.5 percent of the estimated commercial barrow and gilt slaughter for the year. Payments would have ranged from a high of \$10,866,227 for the marketings during the 50th week to a low of \$636,733 for marketings during the 21st week. The support price exceeded the market price of barrows and gilts by \$3.18 per hundredweight during the 31st week and the highest payment per 100 pounds would have been required after this week. The low weekly payment of \$.23 per 100 pounds would have been made after the 23rd week.

Comparison with Payment on an Annual Basis

The previous program was constructed so that the difference between the support and the average market price per hundredweight could have been made up to producers after each week. The program would have provided subsidies for hogs marketed only during the weeks when the weekly average market prices were less than the support prices.

This program could be expected to operate differently from a program that would provide for the determination of payment size at the end of the year. Payment size under the latter program is determined by the difference between the annual weighted average market price and the support price. Payments are the same size per hundredweight for all hogs eligible for direct payments if the annual weighted average price is less than the support price. If the yearly weighted average price is higher than the support price no payments are made. Seasonally above average prices offset seasonally below average prices. It is conceivable that no payments would be made under this system when several weekly payments would be required if payments were made on a weekly basis. The average size of payment per hundredweight and the number of hogs subsidized could also be expected to differ under the two programs.

Data used in estimating the weekly payments are now used to compare the previous program with a program that would provide for an annual determination of payment size and payment allocation. Commercial barrow and gilt slaughter estimates were assumed to be the same as under the previous program. The difference between the yearly weighted average market price and the support price was computed to determine the size of the direct payment per hundredweight for each barrow and gilt. Total yearly payments were estimated by

multiplying the direct payment per hundredweight by the estimated total live weight of commercially slaughtered barrows and gilts.

Yearly eight market barrow and gilt prices for the previous 10 years (34, 35) were averaged to compute a base price for each year from 1956 through 1959. The support level was set at 80 percent of the yearly base prices. Weighted average barrow and gilt prices were computed for each of the 4 years. The estimated total weight of the barrows and gilts commercially slaughtered each week were used to weight the weekly prices.

For 1956 the estimated yearly weighted average price of barrows and gilts was \$14.89 per hundredweight and \$1.28 below the hypothetical \$16.17 support price. The total payments under this program would have been \$196,590,858, or an estimated \$52,429,522 less than under the weekly payment program.

The yearly weighted average prices of barrows and gilts exceeded the hypothetical support levels for 1957 and 1958. No payment would have been required.

For 1959 the hypothetical support price was \$15.10 per hundredweight and \$.38 greater than the estimated yearly weighted average price of barrows and gilts. Payments for 1959 would have been \$61,897,522 and \$105,055,800 less than under the program that would have provided weekly payments.

The figures in Table 14 can be used to illustrate the difference between the two methods of payment size determination and payment allocation.

Table 14. Payment size and the number of barrows and gilts subsidized under hypothetical, alternative direct payment programs

	Total payment	Average payment per cwt.	Number subsidized
Weekly payments			
1956	\$249,020,380	\$1.62	64,155,082
1959	166,953,322	1.02	44,008,133
Annual payments			
1956	196,590,858	1.28	69,176,242
1959	61,897,552	.38	71,595,867

The program that would have provided for an annual determination of payment size would have allowed subsidization for all barrows and gilts, but at a lesser rate per hundredweight. Although the number of barrows and gilts subsidized would have been greater the total payments would have been considerably smaller.

The Limit of Payments Provision

In the analyses above payments were made for barrows and gilts only; other slaughter classes were excluded from eligibility for direct payments. The program would have permitted payments for an average of about 88 percent of the total commercial hog slaughter over the 4 year period. Barrows and gilts constituted an estimated 88.10 percent, 88.25 percent, 88.43 percent and 87.76 percent of the total commercial hog slaughter for the 1956 through 1959 period.

The previous chapter involved a study of direct payment programs with provisions limiting direct payments to a maximum of 100 hogs or 200 hogs, from all slaughter classes, per producer. A previous estimate indicated that a program that would have limited payments to a maximum of 100 hogs per producer would have permitted subsidization for about 80 percent of the hogs sold in 1954. This is about 8 percent fewer hogs than could have been subsidized under a program that would have limited payments for barrows and gilts. The comparison made assumes that the figures would have been comparable between years.

The program with the 200 hog limit would have permitted direct payments for over 93 percent of the hogs sold in 1954. A program that would limit payments to barrows and gilts would have allowed subsidization for about 5 percent fewer

hogs than a program with a 200 hog limit, again assuming comparability between years.

Appraisal of the Program

The estimated yearly payments under the program that would have provided weekly payments were high relative to the largest recent expenditure for price assistance to hog producers. For example, the program for 1956 would have cost an estimated \$249,020,380 or about \$148,000,000 more than the surplus pork and lard purchase program undertaken by the government in 1955. Total weekly payments for 1959 would have been about \$82,000,000 less than the 1956 total, but still about \$66,000,000 greater than the cost of the 1955 purchase program.

The cost of the program that would have provided annual payments was somewhat less. This program, however, would not have been as effective against price uncertainty. For 1956, the annual payment program would still have been relatively expensive--costing an estimated \$196,500,858. For 1959, however, the estimated annual payment would have been \$61,897,552 or about \$39,000,000 less than the 1955 purchase program. In appraising the program that would have provided weekly payments it is realized that the cost of the program probably would have been greater than estimated, since production may have increased due to the guaranteed prices.

It was estimated that a greater percent of the hogs would have to be subsidized if payments were limited to 100 hogs, from all slaughter classes, rather than to barrows and gilts and therefore greater costs would be incurred with a given level of support. This probably would not be true for a 200 hog limit and there would be less chance of discouraging some large scale producers if payments were limited to barrows and gilts rather than to 200 hogs per producer.

A program that would limit payments to barrows and gilts would give no group of producers preferred treatment. If the program induced producers to expand output, the expansion would be more uniform. The incentive for small scale producers to increase production would be no greater than for the high volume producer. There would be less chance of inducing less efficient producers to produce a greater percent of the hog marketings.

The guaranteed minimum prices that the program would provide would allow producers to allocate resources more efficiently than under the open market. It would also allow more efficient resource allocation than an annual payment program.

DIRECT PAYMENTS FOR HOG PRODUCERS LIMITED
TO QUOTA MARKETINGS

In this part of the study an alternative direct payment program for hog producers is considered. Some of the effects of marketing quotas for hog producers, with direct payments limited to quota marketings, are estimated. The program is designed to facilitate supply adjustment in hog production.

Marketings quotas to date have been used for milk and for controlling crop production. The producers of all the basic commodities have been subject to acreage allotments. The quota marketings of these producers was the production from their acreage allotments. Penalties of varying sizes were imposed for marketings in excess of quotas.

A direct payment program that would allow direct payments for the quota marketings of hog producers could take different forms. Payments could be limited to quota allotments and penalties imposed for marketings in excess of quotas. Rigid supply adjustment could be incorporated if the penalties for excessive marketings were large.

Several problems, however, could arise if this procedure were followed.

Hogs, unlike wheat or cotton, cannot be stored until the next year without a change in form. Producers can only estimate the number of barrows and gilts that will be

marketed from the sows they intend to farrow. Producers would have only a few alternatives if their production was in excess of the quota. A greater number of hogs could be consumed on the farm. Increased farm consumption, however, would provide only a limited additional outlet. Hogs that could not be marketed under the quota could be retained for breeding stock for the next year. Hogs that could not be more profitably disposed of could be sold subject to the penalty.

A direct payment program could be established with the stipulation that payments would be made for only the hogs sold under the quotas with no penalties for marketings in excess of quotas. Producers could then market hogs in excess of their quotas if their cost structures permitted. This type of program receives primary consideration in the following study. A smaller portion of the study is devoted to estimating the possible effects of a system of quotas designed for rigid supply control.

Announcement of the Quota

The government would have to determine the national quota about a year in advance if producers were to be given a chance to adjust production to comply with their individual quotas. It would probably require a month for the government to determine and inform producers of their individual quotas

after the determination of the national quota. Quotas would have to be announced to producers at least 11 months in advance, since the gestation period of the sow is about 4 months and growing and fattening of the barrows and gilts would require approximately 7 months.

A problem arises when the question of how to establish a national quota is raised. If a national production quota is established to provide a stable future pork supply, time becomes an important factor. Producers must know their quotas at least 11 months in advance to adjust farrowing to comply with these quotas. Therefore, pork supplies for the period in which the quotas apply would have to be estimated on the basis of statistics available about a year in advance of the time when the quotas are in effect.

Methods and Assumptions Used in Establishing the Hypothetical System of Quotas

A hypothetical system of quotas is established to apply to 1959 United States hog marketings. For simplicity estimates of the effects of these quotas are made on an aggregated regional basis.

The methods and assumptions used in establishing the quotas are:

- (a) The quotas apply to all hogs.
- (b) The marketing period for which the quotas apply is

January 1, 1959 through December 31, 1959.

(c) Pork supplies for 1959 are estimated from pork supply and distribution data available at the end of 1957 to simulate conditions that would have been encountered if a system of quotas had been considered at that time.

(d) Estimated pork supplies for 1959, in pounds, are converted to a national marketing quota by dividing the pork supplies figure by the average pork production per hog during a historical period.

(e) The quotas are assumed to have been issued to producers by February 1, 1958.

(f) Quota allotments are issued on the basis of historical marketings during a base period. As an alternative, a base period adjusted for regional trends in marketings is used.

Estimating 1959 Pork Supplies

United States pork supplies for 1959 are estimated, with one exception, on the basis of statistics available at the end of 1957. The one exception is a population estimate that would not have been available at that time, but could easily have been projected.

The following formula is used to estimate total pork supplies for 1959: Projected trend of civilian per person pork consumption x civilian population as estimated for July

1, 1959 + estimated military requirements + estimated ending stocks - estimated net imports - estimated beginning stocks - estimated farm slaughter = total estimated 1959 pork supplies.

The trend in per person pork consumption from 1946 through 1957 is projected to 1959. The 1946 through 1957 period was selected to approximately reflect recent consumption patterns. Denoting civilian per person pork consumption by Y and time by X, the regression equation used to project civilian per capita pork consumption to 1959 is

$$Y = 73.2366 - 0.8364X.$$

The trend value, -0.8364 pounds per person per year, is significantly different from 0 at the 5 percent level.

Figure 4 shows pork consumption per person from 1946 through 1957 and the mathematically fitted trend line.

A July 1, 1959 population estimate (41) is used to approximate the average population for the year. Military requirements for pork during 1959 were estimated assuming continued peace with approximately the same number of people as in 1957 serving in the armed forces. Therefore, the armed forces pork requirements for 1959 are approximated by the 1957 figure (34, p. 285).

Estimates of 1959 beginning and ending stocks, net imports and farm slaughter are simply the averages of these quantities for the 4 year period 1954 through 1957 (34,

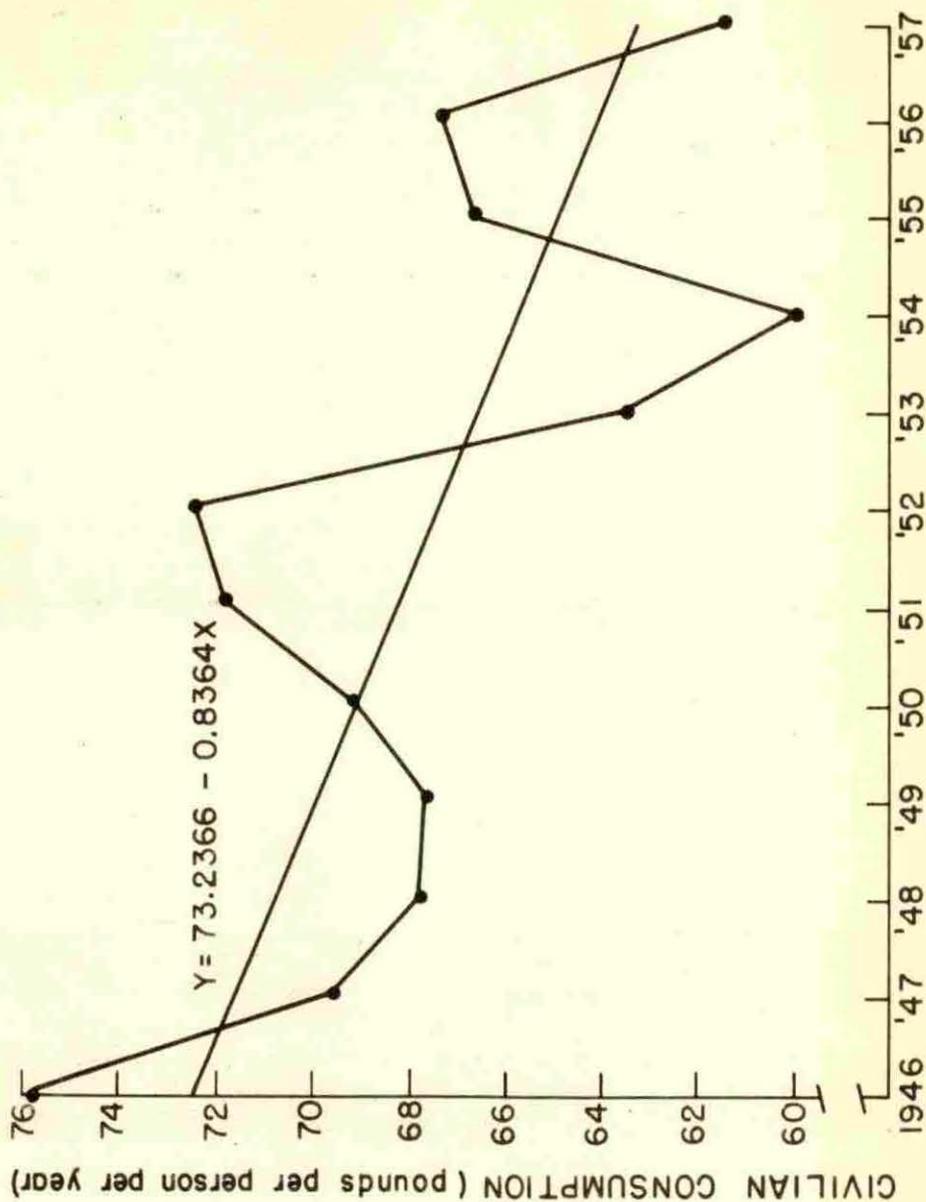


Figure 5. Civilian consumption of pork per person 1946 through 1957 and the mathematically fitted trend line

p. 285). The magnitude of these quantities tends to show some variation according to the stages of the hog cycle. An average of these quantities over the previous hog cycle is used to approximate the magnitude of these quantities for 1959.

Upon substitution of the values into the equation, the estimated 1959 pork supplies = $61.53 \text{ lbs.} \times 174,566,000 + 213 \text{ mil. lbs.} + 336 \text{ mil. lbs.} - 35.25 \text{ mil. lbs.} - 369 \text{ mil. lbs.} - 935.87 \text{ mil. lbs.} = 9,949,152,282 \text{ lbs.}$

The pork supplies estimate is converted to a national marketing quota in terms of hog numbers by division by 134 pounds--the average production of pork excluding lard per hog commercially slaughtered during the 1954 through 1957 period (34, p. 196).

Average production of pork per hog is related to factors affecting the live weight of hogs marketed. Some of these factors are the supplies of feed grain available for fattening, the hog-corn ratio during the fattening period, and the size of the current pig crop. An average of pork production per hog for the duration of a hog cycle (1954 through 1957) provides an estimate of what the average production of pork per hog might have been in 1959.

Apportioning the Quotas

The estimated national marketing quota for United States hog producers in 1959 is 74,247,405 hogs. This quota is first distributed among producers in the nine regions on the basis of historical marketings. The historical marketing base period is 1954 through 1957. Average hog marketings over the period were 74,161,500 per year. The average marketings during the base period were 0.12 percent less than the estimated national quota for 1959.

The quotas were allocated to the producers in the regions according to their relative marketings during the base period. Table 15 shows the quota allotments for producers in each region--the marketings from each region that would have been eligible for direct payments. Also shown are the base period average marketings and the percent of the national quota allotted to producers in each region.

The figures of greatest significance in Table 15 are the percentages of the national marketing quota allotted to producers in the East North Central and West North Central regions. These producers are allotted about 82 percent of the national quota. Producers in the New England, Mountain and Pacific regions are allotted about 2 percent of the quota.

Table 15. Base period average marketings, the number and percent of hogs allocated to producers in each region under the hypothetical marketing quotas^a

Region	Base period average marketings	Quota allotment	Percent of quota
New England	169,750	169,946	.23
Middle Atlantic	974,250	975,379	1.31
East North Central	24,614,750	24,643,262	33.19
West North Central	36,113,500	36,155,332	48.71
South Atlantic	4,509,750	4,514,974	6.08
East South Central	4,038,000	4,042,678	5.44
West South Central	2,285,750	2,288,398	3.08
Mountain	663,000	663,768	.89
Pacific	792,750	793,668	1.07

^aBasic data from (38, 39, 40).

An Alternative Basis for Quota Allocation

A marketing quota that is allotted on the basis of historical marketings during a base period tends to be behind the times. The 1954 through 1957 base period used to apportion the quotas began 5 years before the year for which the quotas apply. When quotas are assigned on the basis of marketings during a base period, producers are apportioned quotas according to their relative marketings during this

period. This system tends to project the geographical marketing patterns of the past into the future. The portion of the Nation's hogs marketed by producers in the different regions changes over time. A historical base period cannot fully reflect these regional changes.

Regional trends in hog marketings

For six of the nine regions positive trends in hog marketings are estimated for the period 1946 through 1957. Negative trends in marketings are estimated for the other three regions during the period. Table 16 shows the regional trends in hog marketings and the level of significance of each trend. The numbers in the columns showing the level of significance are the Student's "t" values.

Economic theory suggests reasons for the increasing or decreasing trends in marketings within the regions. It might be hypothesized that producers in the regions with significant downward trends in marketings found it profitable to shift resources away from hogs to other enterprises. The production possibility curves of individual producers may have changed. The slopes of iso-revenue curves may have changed. New technology may have been better adopted to competing enterprises making them more profitable or less costly to produce than hogs. The slopes of the iso-revenue curves may have changed due to a change in price ratios. Competing

Table 16. Trends by region in hog marketings per year 1946 through 1957 and the level of significance of each trend^a

Region	Trend (hogs per year)	Level of significance		
		1 percent	5 percent	Non. sig.
New England	5,269			1.798
Middle Atlantic	33,483		2.437	
East North Central	458,556	4.124		
West North Central	532,962			1.949
South Atlantic	207,650	5.488		
East South Central	148,528	3.335		
West South Central	-95,844			-2.061
Mountain	-34,773		-2.835	
Pacific	-25,790		-2.836	

^aBasic data from (37, 38, 39, 40).

commodities may have increased in price relative to hogs. The opposite in production developments and prices may have occurred in the regions with significant upward trends in marketings.

If the reasons for the regional trends in hog marketings are as hypothesized, a method of apportioning quotas that took these trends into account would have economic efficiency characteristics to recommend it over a static base period that did not. The most efficient combination of pork and

competing commodities in the regions could be more nearly approached with a base adjusted for trends.

The 1954 through 1957 marketing base was modified to estimate how quota allotments and direct payments by regions would have been affected by including marketing trends. A modified base was computed for each region with a significant marketing trend. The modified base was computed by adding to or subtracting from the 1954 through 1957 base the trend value in marketings to approximate the expected increase or decrease in marketings during 1958 and 1959. This procedure assumes a continuation of the 1946 through 1957 trends in regional hog marketings. An example will clarify the procedure. To compute the marketing base for producers in the Pacific region 2 x 25,790 or 51,580 hogs were subtracted from the 1954 through 1957 marketing base. The 51,580 hogs constituted the expected decrease in marketings during 1958 and 1959. In the regions where the marketing trends were not significantly different from zero the 1954 through 1957 base is again used to apportion the quotas.

Table 17 shows the base quantities, the regional allocation of the quotas and the percent of the national quota allocated to producers in each region. Producers are now allocated their quotas on the basis of their probable relative marketings during 1959.

Table 17. Base quantities, the regional allocation of the quotas and the percent of the national quota allocated to producers in each region under the modified base^a

	Base quantity	Regional quota	Percent of quota
New England	169,750	166,411	.22
Middle Atlantic	1,041,216	1,020,740	1.38
East North Central	25,531,862	25,029,765	33.71
West North Central	36,113,500	35,403,311	47.68
South Atlantic	4,925,050	4,249,805	6.50
East South Central	4,335,056	4,249,805	5.73
West South Central	2,285,750	2,240,799	3.02
Mountain	593,454	581,783	.78
Pacific	741,170	726,594	.98

^aBasic data from (38, 39, 40).

The producers in the regions with significant positive marketing trends now have additional hogs included under their quotas. Producers in the regions with insignificant or negative marketing trends would have had fewer hogs eligible for direct payments after the reapportionment. Producers in the West North Central region would have been allotted about 1 percent less of the national quota if the modified base had been used to distribute the quotas. The

reduction in number of hogs eligible for direct payments from producers in this region would have been 752,021. An estimated 81,985 fewer hogs would have been eligible from the Mountain region if the modified base had been used to apportion the quotas. Producers in the East North Central region would have had the greatest increase in numbers of hogs eligible for direct payments--386,503.

Estimated Payments

Estimates are now made of the payments that would have been made to producers under the direct payment program for quota marketings. The magnitude of the payments would have been primarily dependent upon the level of the support price, the percent of producer participation, and the percent of participating producers who would have marketed their full quota allotments.

The support price used is 80 percent of the United States average price of hogs for the 10 year period 1949 through 1958 (34, 35). The payment procedure is similar to that used by the Canadians under their deficiency payment program. A payment estimate is made assuming that the government would have made up to each producer, for his quota marketings, the difference between the 1959 United States weighted average market price and the support price. Additional assumptions made in the computation of the payment estimates are: (a) 100

percent producer participation, (b) that each producer would have marketed his full quota allotment, and (c) that marketings would have been unaffected by the direct payment program. The last assumption implies that producers simply would have taken their chances on the open market for marketings in excess of their quotas.

The estimated weighted average price of hogs in the United States was \$14.07 per hundredweight in 1959. The hypothetical support price is \$14.70 per hundredweight. The support price is 80 percent of the average price received by farmers for hogs from 1949 through 1958. Payments would have been \$.63 per hundredweight for all hogs sold under quotas.

Estimates are made of the total payments that would have been required for producers in each of the nine regions. In the estimation process, the simple average weight of the hogs marketed within each region is multiplied by the difference between the support and the weighted average market price. This provides an estimate of the average payment that would have been required for each hog marketed under quotas by producers in each region. Total regional payments are estimated by multiplying the average payment per hog by the estimated number of hogs eligible for direct payments from each region. It was necessary to assume that the hogs marketed under the quotas would have had an average weight equal to the average for all hogs marketed within the regions.

Estimates are made of the total payments that would have been required under both methods of apportioning the quotas. Regional payments would have been as shown in Table 18 under the assumed payment procedure.

The total payments would have been approximately the same regardless of the method used to apportion the quotas.

Table 18. Regional payments and the percent of the total payment received by producers in each region under alternate methods of quota allocation

Region	Payments 1954-'57 base	Percent of payment	Payments modified base	Percent of payment
New England	\$ 253,220	.23	\$ 247,952	.23
Middle Atlantic	1,326,515	1.21	1,388,206	1.27
East North Central	36,718,460	33.60	37,294,350	34.16
West North Central	54,594,551	49.96	53,459,000	48.96
South Atlantic	5,824,316	5.33	6,228,374	5.71
East South Central	5,336,335	4.88	5,609,743	5.14
West South Central	3,226,641	2.95	3,159,527	2.89
Mountain	935,913	.86	820,314	.75
Pacific	1,071,452	.98	980,902	.89
Total	109,287,403	100.00	109,188,368	100.00

This is logical since the total number of hogs eligible for direct payment would have been the same for both methods of allocating the quotas. Total payments would have been slightly greater if the 1954 through 1957 historical marketing base had been used to apportion the quotas. More of the heavier hogs from the West North Central region would have been eligible for direct payments.

Regional payments would have differed under the alternate methods of apportioning the quotas. Producers in the West North Central region would have received a \$1,135,551 greater payment if the 1954 through 1957 historical marketing base had been used to apportion the quotas. Payments for producers in the East North Central region would have been \$575,890 greater under the modified base than under the 1954 through 1957 historical marketing base.

The Use of Quotas for Supply Control

In the preceding analysis direct payments were only for the hogs needed to provide a stable future pork supply. Producers who marketed hogs in excess of their quotas simply received no direct payments for their excess marketing.

The volume of marketings, hog prices and the value of the marketings probably would have been considerably different if hog marketings could have been restricted to the quotas during 1959. The hypothetical national marketing quota

called for 74,247,405 hogs. Total hog marketings in 1959 were 84,397,000 (35, p. 34). An estimate of the possible effects of a rigid supply control measure can be made if it is assumed that marketing weights would not have changed due to the program and that marketings could actually have been restricted to the quotas.

The quota allotment for 1959 was 10,149,595 smaller than the actual marketings. The average weight of hogs marketed during 1959 was 234 pounds (35, p. 34). Assuming that the program could have prevented producers from marketing these 10,149,595 hogs and that the hogs would have weighed an average of 234 pounds (the average marketing weight during 1959) the reduction in marketings in hundreds of pounds during 1959 would have been 23,750,052. Total hog marketings in hundreds of pounds during 1959 were 197,500,000 (35, p. 35). If these marketings could have been reduced by 23,750,052 hundredweight it would have constituted a 12.03 percent decrease in quantity.

Estimated effects on hog prices and the value of marketings

An estimate of the elasticity of demand for hogs at the farm level is used to estimate the effect on hog prices a 12.03 percent decrease in the quantity of marketings would have had during 1959. The demand elasticity estimate used is -0.4 (28, p. 6). The estimated percentage increase in

price that would have been associated with the 12.03 percent decrease in quantity is 30.08 percent. For 1959 the estimated average hog price would have been \$18.30 per hundredweight rather than \$14.07. No direct payments would have been required if the previous support price had been used to determine the size of payment per hundredweight.

The actual value of the hog marketings during 1959 can be compared with the estimated value of the sales if marketings had been restricted by a quota. Table 19 shows the actual marketings during 1959 in hundreds of pounds, the estimated weighted average yearly price, and the estimated value of the marketings. An estimate of the value of the marketings was computed by multiplying the price per hundredweight by the total marketings in hundreds of pounds. Also shown in Table 5 are the estimated quota marketings, price per hundredweight, and the value of the quota marketings.

The estimated value of the smaller quota marketings is \$3,179,633,198 or 11.44 percent higher than the actual value of the hog marketings for 1959.

Obviously many doubtful simplifying assumptions were necessary before an estimate of the possible effects on prices, marketings and the value of marketings could be made. The government would have had to prevent any marketings in excess of quotas. This would have been difficult. Possibly very severe penalties for producers who marketed in excess of

Table 19. Actual 1959 and hypothetical quota marketings, prices and value of marketings.

	Marketings (hundreds of pounds)	Price per hundredweight	Value of marketings
Actual 1959	197,500,500 ^a	\$14.07	\$2,778,832,035
Quota 1959	173,750,448	18.30	3,179,633,198

^aTaken from (35, p. 34).

their quotas could have accomplished the needed reduction. Producers could have been required to destroy any hogs they could not consume or keep from market channels in any other way. Public resentment, however, probably would have been encountered if this practice had been followed.

Producers might have marketed their hogs at heavier weights, since the number of hogs they would have been allowed to market would have been restricted. An increase in marketing weights would have partially offset the decrease in hog numbers and would have had a depressing effect on hog prices. A total offset, however, through an increase in marketing weights would have been unlikely. The average live weight of the 74,247,405 hogs requested under the quota would have had to have been 266 pounds to equal the actual total live weight of the hogs marketed in 1959.

Appraisal of the Program

The cost to the government of the direct payment program for quota marketings would have been low relative to most of the limited direct payment programs considered in the study. Payments would have totaled about \$109,000,000 under the program that would not have penalized producers for marketing in excess of quotas. A program that would cost the government only about \$8,000,000 more than the 1955 purchase and diversion program could have political acceptability.

Under the program with restrictive quotas no payments would have been required with the level of support that was used. The increased prices that would have been associated with the smaller marketings would have raised the market price to an estimated \$18.30 per hundredweight or \$3.60 above the hypothetical \$14.70 support price. This estimate of the effect of the restrictive quota was made assuming the government could have restricted marketings to the quota, which probably would have been difficult.

A program that would not penalize producers for marketing in excess of quotas probably would have little negative or positive effect on production efficiency. Some positive effect could be realized if the program provided a better basis for production planning than the open market. However, the program could not be expected to remove a great

deal of price uncertainty from hog production, since producers would not know the size of the direct payment per hundredweight until the end of the year.

A restrictive quota could have negative effects on production efficiency by retarding resource mobility. A restrictive quota, for example, would not allow any producers, regardless of the efficiency, to expand production above their quota allotments. Small, inefficient producers might also be induced to remain in hog production as long as direct payments would be made for their quota allotments.

SUGGESTIONS FOR FURTHER STUDY

It would seem that research could profitably be devoted to an examination of variations or combinations of the programs that were considered in the study. For example, a quota program could be used in combination with a program that would limit payments to 100 or 200 hogs per producer. This type of program could remove the incentive for small scale producers to expand production up to the maximum number of hogs eligible for subsidy. Work could also be undertaken to estimate the costs and effects of a program that would limit payments to 100 or 200 barrows and gilts per producer, rather than to 100 or 200 hogs from any slaughter class. It may be possible to evaluate programs that would limit payments to a uniform, maximum number of hogs per producer more effectively when more recent Census data become available.

The relative cost of the quota program was quite low and for this reason may be thought to hold a considerable amount of promise. Work needs to be done, however, on more refined ways to estimate stable future pork supplies.

Possibly the quota could be modified and established on the basis of historical farrowings rather than hog marketings. A producer could receive direct payments for all hogs marketed from the farrowings of the sows eligible

under the quota. No producer would be penalized for the efficient practice of raising an above average number of pigs per litter.

The estimates of the costs of the previous programs were determined primarily by the support prices used. Other support levels and methods of support need to be examined to obtain cost estimates under alternative support procedures.

SUMMARY

The study involved an appraisal of various limited direct payment programs for hog producers that could be undertaken by the government for alternative economic objectives.

Estimates were made of the probable effects of the programs and costs of the programs to the government. An appraisal was made of the acceptability of the programs in terms of costs. The costs of the programs were compared with the highest expenditure made by the government during 1955 for a pork and lard purchase and diversion program. Programs requiring payments considerably in excess of the 1955 expenditure were considered of questionable acceptability. In the appraisal, attention was called to some of the possible effects of the programs on production efficiency.

The Canadian direct payment program was examined to gain some knowledge of the operation and effects of a limited direct payment program for United States producers. Some of the features of the Canadian program were used in the development of subsequent hypothetical programs for United States producers.

Estimated Effects of Limited Payments

Agricultural Census data for 1954 were used to estimate the effects of direct payment programs that would limit direct

payments to a uniform, maximum number of hogs per producer. The effects of programs with alternative size limits were estimated. It was estimated that about 89 percent of the producers in the United States could have had their entire sales subsidized under a program with a 100 hog limit. About 97 percent of the producers could have had their entire hog sales subsidized if payments had been limited to 200 hogs per producer.

The estimated percent of volume sold in 1954 that would have been eligible for direct payments is about 80 percent for the 100 hog limit, and nearly 94 percent for the 200 hog limit.

Producers in the three Southern regions would have had the best relative position under the limited direct payment programs, since a large percent of the producers were small scale producers and could have had their entire sales subsidized. Over 98 percent of the producers in the three Southern regions could have had their entire sales subsidized under a 100 hog limit, and over 99 percent under a program that would have limited payments to 200 hogs per producer. The estimates indicated that over 95 percent of the hogs marketed by these producers would have been eligible for payments.

A direct payment program that would have limited payments to 100 hogs per producer would have been considerably more

restrictive on producers in the most important hog producing regions--the two North Central regions. About 84 percent of the producers in the East North Central region, and 82 percent in the West North Central region could have had their entire sales subsidized under a program with a 100 hog limit. The entire sales of about 95 percent of the producers in the two regions could have been subsidized if payments had been made for a maximum of 200 hogs per producer. A 100 hog limit would have allowed direct payments for about 76 percent of the hogs marketed in the East North Central region and about 79 percent of the hogs sold from the West North Central region. If payments had been made for a maximum of 200 hogs over 93 percent of the hogs in the two regions would have been eligible for direct payments.

An estimate was made of the effect of a short-run limited direct payment program on the distribution of the gross income from hog sales among Iowa hog producers. The estimates obtained indicated that the program would have had very little effect on the distribution of income.

Estimated costs

The estimated cost of a direct payment program that would have provided a \$2.00 per hundredweight direct payment for all hogs sold during 1954 was compared with the estimated cost of alternative programs that would have limited payments

to a maximum of 100 or 200 hogs per producer. The cost of the unlimited direct payment program was estimated as \$286,439,532. A program that would have limited payments to 100 hogs per producer would have cost an estimated \$228,573,598, or about 20 percent less than the program for all hogs. The program with a 200 hog limit would have cost an estimated \$267,753,861, or about 6 percent less than the program for all hogs.

A cost study by Purdue University was used to identify some of the possible subsequent effects of limited direct payment programs. The Purdue study indicated that neither a 100 hog limit, nor a 200 hog limit, would encourage the most efficient size enterprise. The study showed that average production costs per hundredweight for 5 to 14 sow herds were \$2.36 higher than for 55 to 64 sow enterprises. Expressed in numbers of hogs sold from a single season's farrowings, the lowest costs were realized with sales of between 350 and 400 hogs. The study gave indications that the Nation's hogs would be produced at a greater resource cost if a limited direct payment program induced smaller producers to market a greater percent of the hogs.

Payments on barrows and gilts only

The second limited direct payment program for United States producers contained a provision that limited payments

to barrows and gilts and excluded other slaughter classes from eligibility for payments. The objective of the program was to reduce price uncertainty in hog production. Weekly support prices were established for the hypothetical program and direct payments were made whenever the market prices of barrows and gilts at the eight terminal markets dropped below the weekly support prices. The support prices were set at 80 percent of the average weekly prices of barrows and gilts at the eight terminal markets for the corresponding weeks for the previous 10 years. The cost of the program was estimated for the 4 year period 1956 through 1959.

For 1956 the estimated weekly payments totaled slightly over \$249,000,000. No payments would have been required during 1957 and 1958, since the market prices of barrows and gilts exceeded the hypothetical support prices for all weeks. Estimated payments for 1959 were about \$167,000,000.

A cost comparison was made between this program and a program that would have provided payments on an annual basis. It was found that the cost of the annual payment program would have been considerably smaller for 1956 and 1959. The annual payment that would have been required for 1956 marketings was \$196,590,858, or an estimated \$52,429,522 less than the sum of the weekly payments. For 1959 the annual payment would have been only \$61,897,522 and \$105,055,800 less than the total of the weekly payments. Although the

cost of the annual payment program would have been considerably smaller, the program would not have been as effective against price uncertainty as the weekly payment program.

An average of about 88 percent of the hogs marketed during the 1956 through 1959 period would have been eligible for direct payments under the program. It was estimated that about 8 percent more hogs would be subsidized under this program as compared to a direct payment program that would limit payments to 100 hogs per producer from any slaughter class. A 200 hog limit would allow subsidization for about 5 percent more hogs than a program that would limit payments to barrows and gilts. These estimates assume comparability between years.

Payments on quota marketings

The final program examined was a system of direct payments for quota marketings. A hypothetical national hog marketing quota was established for 1959 hog marketings. The production quota was established to provide a stable pork supply for 1959. National pork supply for 1959 were estimated on the basis of pork supply and distribution statistics available at the end of 1957 to simulate conditions that would have been encountered if a system of quotas had been considered at that time.

A national marketing quota of 74,247,465 hogs was

established for the 1959 marketing year. The quota was first apportioned to producers on the basis of their relative marketings during a 1954 through 1957 base period. As an alternative basis for allocation, the 1954 through 1957 base was adjusted for regional trends in marketings. Quotas were then assigned to producers on the basis of their probable relative marketings in 1959.

An estimate was made of the direct payments that would have been made under the program assuming that no penalties would have been imposed on producers who marketed in excess of their quotas. Producers were assumed free to produce and market in excess of their quotas if their individual cost structures permitted. They received direct payments, however, for only the marketings needed to provide a stable pork supply for 1959.

Estimates of the regional and national payments were made using actual 1959 marketing figures. It was assumed that the government would have paid each producer the difference between the support and the annual weighted average market price for quota marketings. The hypothetical support price was \$14.70 per hundredweight--80 percent of the United States average price received by farmers for hogs from 1949 through 1958. The yearly weighted average price was \$14.07 per hundredweight. Total payments were estimated for both

methods of apportioning the quotas. The total payments were about \$109,000,000 under both methods of apportionment.

An estimate was made of the possible effects on marketings, hog prices, and the value of marketings assuming that the government could have restricted marketings to the quota. The estimated value of the smaller quota marketings would have been 11.44 percent greater than the actual value of the hog marketings during 1959. No direct payments would have been necessary with the \$14.70 support price. Some doubtful simplifying assumptions, however, were necessary before the estimates could be made.

Comparative Costs and Effects on Production Efficiency

Most of the programs considered in the study would have been quite costly to the government. For example, the total cost of the weekly payment program for 1956 exceeded \$249,000,000. Total payments under the program with the 200 hog limit were estimated as \$267,753,861. With the criterion of acceptability adopted, these programs can be considered of questionable acceptability. The cost of the quota program would have been more moderate. Costs might not prevent the institution of this program. Only the annual payment program for barrows and gilts, during 1959, would have cost less than the maximum expenditure under the existing

assistance program.

The program that would probably contribute the most to more efficient use of resources is the weekly payment program for barrows and gilts. A weekly guaranteed minimum price announced approximately a year in advance would contribute to the use of more efficient combinations and more nearly correct amounts of resources in hog production.

A direct payment program with a 100 or 200 hog limit could have adverse effects on production efficiency in subsequent years. The adverse effects would occur if small scale, less efficient producers were to expand output to the extent that the depressing effect on prices would make production in excess of the limit unprofitable for some large scale producers. It would then require more resources to produce the Nation's hogs than before the institution of the program.

The direct payment program for quota marketings that would allow production and marketings in excess of the quota would be likely to have little negative or positive effect on resource use. Some contribution to more efficient resource use might result if the program provided a better basis for production planning than the open market. A restrictive quota could have an adverse effect on production efficiency by retarding resource mobility.

LITERATURE CITED

1. Bauman, R. H. and L. Eisgruber. Moderately large hog enterprises again pay best. Dept. Agr. Econ., Purdue University. Lafayette, Indiana. April 30, 1960.
2. Brandow, G. E. A modified compensatory price program for agriculture. J. Farm Econ. 37: 716-730.
3. _____. Direct payments without production controls. In U. S. Congress. 86th. 2d. sess. Joint Economic Committee. Economic policies for agriculture in the 1960's. pp. 65-74. United States Government Printing Office. Washington, D. C. 1960.
4. Canada Agricultural Stabilization Board. Annual Report, 1958-59.
5. _____. Annual Report, 1959-60.
6. Canada Dept. Agr. Economics Division. Current Review of Agricultural Conditions in Canada. 20, N. 6. Nov. 1959.
7. _____. Economics Division. Current Review of Agricultural Conditions in Canada. 21, No. 1. Jan. 1960.
8. _____. Economics Division. Current Review of Agricultural Conditions in Canada. 21, No. 2. March 1960.
9. _____. Economics Division. Current Review of Agricultural Conditions in Canada. 21, No. 3. May 1960.
10. _____. Economics Division. Current Review of Agricultural Conditions in Canada. 21, No. 5. Sept. 1960.
11. _____. Economics Division. Current Review of Agricultural Conditions in Canada. 21, No. 6. Nov. 1960.

12. _____ . Information Division. Farm News. No. 947.
Nov. 5, 1958.
13. _____ . Information Division. Farm News. No. 960.
May 20, 1959.
14. _____ . Information Division. Farm News. No. 974.
Dec. 16, 1959.
15. _____ . Information Division. Farm News. No. 981.
April 6, 1960.
16. _____ . Information Service. Farm News. No. 931.
March 5, 1958.
17. _____ . Markets Information Section. Production and
Marketing Branch. Livestock Market Review, 1959.
1960.
18. Eggert, R. J. Advantages and disadvantages of direct
payments. J. Farm Econ. 29: 250-255. 1947.
19. _____ . A price policy for agriculture consistent with
economic progress that will promote adequate and
more stable income from farming. J. Farm Econ.
27: 821-828.
20. Engleman, Gerald, Austin A. Dowell, Evan F. Ferrin and
Phillip A. Anderson. Marketing slaughter hogs by
carcass weight and grade. Minn. Agr. Expt. Sta.
Tech. Bul. 187. 1950.
21. Fuller, Wayne, Glen Purnell, Lonnie Fielder, Marvin
Laurson, Ray Beneke and Geoffrey Shepherd. An
alternative parity formula for agriculture. Iowa
Agr. Expt. Sta. Res. Bul. 476. 1960.
22. Galbraith, J. K. Farm policy: the current position.
J. Farm Econ. 37: 292-304. 1955.
23. Halcrow, Harold G. Agricultural policy of the United
States. Prentice-Hall, Inc. Englewood Cliffs,
N. J. 1953.
24. Hamilton, W. E. Direct payments are not the answer. In
U. S. Congress. 85th. 1st sess. Joint Economic
Committee. Subcommittee on Agricultural Policy.
Policy for commercial agriculture; papers submitted
by panelists appearing before the subcommittee.

pp. 671-686. United States Government Printing Office. Washington, D. C. 1957.

25. Harkness, Douglas S. Address by the Honourable Douglas S. Harkness Canada Minister of Agriculture, to the twenty-second annual meeting of the National Farm Institute Des Moines, Iowa, Saturday, February 20, 1960. (Mimeo.) Canada Dept. Agr., Ottawa, Ontario, Canada. 1960.
26. Kutish, Francis A. Farm outlook. Iowa Farm Science. 15, No. 8: 19-20. Feb. 1961.
27. Shepherd, Geoffrey S. Agricultural price and income policy. 3d ed. Iowa State College Press. Ames, Iowa. 1952.
28. _____, Arnold Paulsen, Francis Kutish, Don Kaldor, Richard Heifner and Gene Futrell. Production, price and income estimates and projections for the feed-livestock economy under specified control and market clearing conditions. Iowa Agr. Expt. Sta. Spec. Rep. 27. 1960.
29. Soth, Lauren. Farm policy for commercial agriculture, its relation to economic growth and stability. In U. S. Congress. 85th. 1st sess. Joint Economic Committee. Subcommittee on Agricultural Policy. Policy for commercial agriculture; papers submitted by panelists appearing before the subcommittee. pp. 631-639. United States Government Printing Office. Washington, D. C. 1957.
30. U. S. Dept. Agr. Agricultural Marketing Service. Livestock Division. Market News. 14, No. 2 through 26, No. 52. Jan. 9, 1946 through Dec. 30, 1958.
31. _____. Agricultural Marketing Service. Livestock Division. Market News. 14, No. 2 through 27, No. 52. Jan. 7, 1956 through Dec. 29, 1959.
32. _____. Agricultural Marketing Service. Livestock and Meat Situation No. LMS-92. Nov. 1957.

33. _____ . Agricultural Marketing Service. Livestock and Meat Situation No. LMS-92. Nov. 1957; No. LMS-101. March 1959; No. LMS-108. March 1960; No. LMS-109. May 1960; No. LMS-114. Jan. 1961; No. LMS-115. March 1961.
34. _____ . Agricultural Marketing Service. Livestock and Meat Statistics, 1957. U. S. Dept. Agr. Stat. Bul. 230. 1958.
35. _____ . Agricultural Marketing Service. Supplement for 1959 to Livestock and Meat Statistics. Supplement for 1959 to U. S. Dept. Agr. Stat. Bul. 230. 1960.
36. _____ . Agricultural Marketing Service. Wool Situation No. TWS-45. Oct. 1958.
37. _____ . Agricultural Statistics. Vols. 1948 through 1954.
38. _____ . Agricultural Statistics. Vol. 1955.
39. _____ . Agricultural Statistics. Vol. 1956.
40. _____ . Agricultural Statistics. Vols. 1957 through 1958.
41. U. S. Dept. Comm. U. S. Bureau of the Census. Current Population Reports. Ser. P-25, No. 218. Aug. 1, 1960.
42. _____ . U. S. Bureau of the Census. U. S. Census of Agriculture, 1954. Vol. 2: General Report. United States Government Printing Office. Washington, D. C. 1956.
43. Voth, Alden H. Economic limits of a price-support program for hogs. Unpublished M.S. Thesis. Library, Iowa State University of Science and Technology. Ames, Iowa. 1960.
44. Waugh, Frederick V. A price policy for agriculture, consistent with economic progress that will promote adequate and more stable income from farming. J. Farm Econ. 27: 773-784. 1945.

ACKNOWLEDGMENTS

The author wishes to express appreciation to Dr. Geoffrey Shepherd for his guidance and constructive criticism throughout the course of the study.

Appreciation is also extended to James Gruebele and Don Rohdy for assistance in the development and expansion of several ideas in the thesis.

APPENDIX

Table 20. Estimated payments for 1956 under weekly direct payment program for barrows and gilts

Weeks 1956	Payments	Weeks 1956	Payments
1	\$17,569,812	27	\$1,777,502
2	22,080,942	28	3,021,996
3	19,703,296	29	3,677,321
4	8,941,232	30	3,300,269
5	8,535,778	31	3,402,792
6	12,760,702	32	3,259,767
7	13,101,600	33	2,628,230
8	11,752,207	34	2,888,075
9	16,106,846	35	3,378,164
10	15,621,612	36	2,906,485
11	11,837,047	37	4,507,027
12	7,563,818	38	3,445,474
13	4,549,965	39	1,550,365
14	1,982,035	40	2,101,399
15	2,912,598	41	785,948
16	2,554,786	42	3,019,605
17	2,423,635	43	4,054,731
18	1,744,711	44	5,057,598
19	1,663,278	45	2,964,201
20	0	46	2,956,141
21	0	47	1,036,208
22	0	48	287,807
23	0	49	0
24	0	50	0
25	1,892,809	51	0
26	1,714,572	52	0

Table 21. Estimated payments for 1959 under weekly direct payment program for barrows and gilts

Weeks 1959	Payments	Weeks 1959	Payments
1	\$ 0	27	\$4,831,828
2	0	28	5,259,265
3	0	29	7,433,559
4	0	30	7,624,414
5	0	31	7,764,819
6	0	32	6,757,163
7	0	33	6,334,742
8	0	34	4,603,093
9	0	35	5,085,816
10	0	36	5,928,337
11	0	37	5,144,826
12	0	38	6,911,220
13	0	39	6,896,167
14	0	40	7,077,049
15	0	41	6,460,546
16	0	42	5,844,365
17	0	43	3,674,782
18	0	44	3,583,580
19	0	45	3,712,856
20	1,235,374	46	3,064,947
21	636,733	47	4,241,700
22	1,630,769	48	3,299,674
23	1,810,949	49	6,343,651
24	1,453,764	50	10,866,227
25	1,822,291	51	9,000,327
26	3,026,790	52	7,591,813

Table 22. Regional hog marketing estimates used to establish hypothetical marketing quota for 1959^a

Years	Regional marketings (1000 hogs)									
	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	East South Central	West South Central	West South Central
1946	165	761	20,995	32,288	2,528	2,377	3,146			
1947	144	774	20,468	31,518	2,787	2,676	3,024			
1948	130	817	20,467	28,750	3,322	3,130	3,236			
1949	59	367	21,433	32,861	2,607	3,266	2,613			
1950	120	796	23,421	35,170	4,076	3,941	3,744			
1951	164	975	25,405	38,631	4,151	4,308	3,674			
1952	172	1,057	26,185	39,258	4,776	4,422	3,479			
1953	176	1,026	24,158	34,785	4,452	3,301	2,094			
1954	119	872	23,480	34,051	4,321	3,301	1,841			
1955	181	925	24,284	38,052	4,111	3,573	2,228			
1956	192	1,120	25,643	37,570	4,622	4,509	2,674			
1957	187	980	25,052	34,781	4,985	4,769	2,400			

^aData from (37, 38, 39, 40).