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# Economic Aspects of Specific Pathogen Free Hog Production

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FARM PRODUCTION ECONOMICS DIVISION ■ ECONOMIC RESEARCH SERVICE

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## DEFINITIONS OF TERMS

Commercial licensed laboratory: A laboratory licensed under a patent held by the University of Minnesota. A commercial laboratory is equipped to take pigs from sows by a surgical process (hysterectomy) and to raise the pigs in isolation until they are 4 weeks old.

SPF: Specific pathogen free. SPF pigs are believed free of virus pig pneumonia, atrophic rhinitis, transmissible gastroenteritis, and swine dysentery. SPF animals may be contaminated by nonpathogenic organisms.

Primary SPF pigs: Pigs which are removed from their dam just prior to birth by a surgical process. After birth these pigs are raised in laboratory isolation. Primary pigs have never had a chance to be infected with the diseases carried by their dam.

Secondary SPF pigs: Pigs which are farrowed and raised normally by either a primary SPF dam or a secondary dam.

Closed herd: A herd to which only SPF stock is admitted. Primary stock is admitted directly from the licensed laboratory. Secondary or naturally farrowed stock is admitted to the herd from certified SPF herds.

Certified SPF herd: A herd maintained to produce offspring to stock other farms for the production of certified SPF stock. Certified SPF herds must meet certain standards of growth and health as determined by records, observation on the farm, and inspection at slaughter.

## CONCLUSIONS

SPF hogs have more feeding efficiency (ratio of meat produced to feed fed) than conventional hogs. When feeding efficiency of conventional hogs is reduced because of atrophic rhinitis and virus pig pneumonia, the farmer would profit by changing to SPF hog production.

The cost of the SPF breeding stock replacement, the outlay for additional equipment, the loss in income from the interruption of hog production, and the cost of the cleanup are the major factors to consider in establishing a SPF herd.

The cost of SPF breeding stock replacements of breeding age is approximately \$100 for primary pigs, open secondary gilts, or bred secondary gilts. The original purchase price of secondary gilts is greater, but primary pigs require a larger outlay for labor and feed.

The amount of income foregone, due to the cleanup and interrupted hog production, affects the choice of a method to convert to SPF hog production. The amount of income lost through interrupted production depends upon the length of time production is curtailed and the profitableness of the conventional hog enterprise.

The importance of lost income is related directly to the amount of profits from the conventional hog enterprise and the time hog production is interrupted. An inefficient conventional hog enterprise, with small profits, does not cost the farmer very much in lost income. A more profitable conventional hog enterprise will cost the farmer more in lost income.

Lost income from curtailed hog production is reduced (1) by the purchase of mature breeding stock replacements--secondary gilts rather than primary pigs--or (2) by maintaining two herds until the SPF herd is ready for full production.

Maintaining two herds eliminates time out of production, but other costs will increase. Additional housing and equipment are necessary to care for SPF breeding stock replacements.

If net returns to labor and management are low for the conventional hog enterprise, the farmer can reduce his outlay in converting to SPF hog production by cleaning up existing shelters and equipment before bringing SPF breeding stock replacements on his farm. When returns to labor and management from the conventional hog enterprise are high, the farmer will benefit by setting up separate facilities to house SPF breeding stock replacements.

Feed costs for SPF hogs are 9.5 percent below feed costs for those conventional hogs which require 450 pounds of feed per hundredweight of live weight produce. When conventional hogs require 500 and 550 pounds of feed per hundredweight of production, feed costs are, respectively, 22 and 27 percent higher than feed costs for SPF hogs.

Finally, the SPF hog production program is predicated on the use of sound production techniques. The SPF hog does not substitute for poor management. For the SPF hog to do what it is intended to do, the farmer must maintain good sanitation and nutrition. Costs and techniques of production are about the same as for well-managed, clean, conventional herds.

# ECONOMIC ASPECTS OF SPECIFIC PATHOGEN FREE HOG PRODUCTION

by

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## INTRODUCTION

The Specific Pathogen Free (SPF) hog production program is a recent and important advancement in the control of virus pig pneumonia and atrophic rhinitis, two growth-retarding diseases.

The SPF hog production program is predicated on achieving a break in the disease cycle and preventing reinfection due to direct contact between SPF hogs and hogs infected with virus pig pneumonia and atrophic rhinitis. These diseases, which are transmitted from diseased to healthy animals by direct contact, will die out if no hogs are present to serve as a host.

A break in the disease cycle is made 2 to 4 days before the sow is due to farrow. To avoid the transmittal of virus pig pneumonia and atrophic rhinitis pathogens from the diseased sow to her pigs, the pigs are taken aseptically by a hysterectomy from their dam. The pigs are raised in isolation and they are fed a colostrum-free diet to prevent reinfection from the sow.

The isolation of SPF hogs from diseased hogs is also maintained on the individual farms. Contact with diseased hogs is prevented by removing all diseased hogs from a farm or separating them from SPF breeding stock. Shelters and equipment formerly used by diseased hogs are thoroughly cleaned and disinfected.

In essence the Specific Pathogen Free hog production program follows this pattern: (1) obtain aseptic pigs, (2) raise them in isolation, (3) grow them to maturity under farm isolation, (4) resume normal birth and production.<sup>1/</sup>

The scope of this report encompasses the last three steps of the Specific Pathogen Free hog production program. The first two steps--obtaining aseptic pigs and raising them in isolation--are the responsibility of licensed laboratories. The emphasis in this report is on growing pigs under farm isolation after the resumption of normal birth and production.

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<sup>1/</sup> Caldwell, J. D., Underdahl, N. R., and Young, G. A. Swine Repopulation. III. Performance of Primary Specific Pathogen Free Pigs on Farms. Amer. Vet. Med. Assoc. Jour., Vol. 138, No. 3, Feb. 1, 1961, pp.141-145.



## OBJECTIVES

The research objectives are: (1) to determine the least-cost method of repopulating individual farms, (2) to estimate the possible increase in returns from SPF hog production over the returns from conventional hog production.

## DATA USED

Thirty SPF hog producers were contacted in Iowa and eastern Nebraska. Data obtained by interview were used as a basis for estimating appropriate costs and necessary inputs to analyze SPF hog production.

Data obtained directly from the farmers were supplemented with production data collected by the University of Nebraska College of Agriculture for its SPF Swine Certification Program. Supplemental data were compiled from farmers' records in the SPF Swine Certification Program. Farmers in the certification program keep records to indicate for each group of SPF hogs: (1) the number of pigs born alive, (2) mortality to 35 days, (3) mortality to 140 days, (4) 35-day weight, (5) 140-day weight, and (6) age of pigs at 215 pounds.

Additional data are necessary to accurately measure costs and returns for SPF hog production. Better estimates of inputs are required for both SPF hog production and conventional (non-SPF) hog production. Further work is needed to establish the probability that SPF herds will be reinfected--the longer a herd can be kept free of atrophic rhinitis and virus pig pneumonia the smaller the prorated cost becomes for establishing an SPF herd. Also, data comparing savings in feed and medicaments of SPF hogs over conventional hogs should be amplified.

Gaps in existing data are attributable in part to the short time that the SPF hog production program has been in existence on certain farms. Less than 40 percent of the SPF hog producers contacted in the survey have been producing hogs under the program for more than 2 years.

## SIZE OF HERD

Table 1 gives the sizes of sow herds for the 30 farms surveyed. Before SPF hog production, herds ranged from 6 to 80 sows with an average of 26 sows. Five farms had been out of hog production for one year or more. Three farmers did not farrow pigs, but purchased feeder pigs for fattening.

After converting to SPF hog production, the average herd was 23 sows and the range was from 8 to 40 sows. One farmer purchased SPF feeder pigs for fattening.

Table 1.--Number of farms with sow herds of specified sizes before and after entering SPF hog production, Iowa and Nebraska, 1961

Item	Before SPF production	After SPF production
	<u>Farms</u>	<u>Farms</u>
Size of sow herd:		
Less than 10 -----	3	2
11 - 20 -----	9	11
21 - 30 -----	3	11
31 - 40 -----	2	3
Over 40-----	5	2
Out of production -----	5	None
Fattening feeder pigs-----	3	1
Total number of farms -----	30	30

#### STEPS IN ESTABLISHING A SPF HERD ON A FARM

Five basic steps must be taken to eliminate virus pneumonia and atrophic rhinitis pathogens from a farm:

1. Remove all diseased hogs from the farm.
2. Thoroughly clean and disinfect all buildings and equipment formerly used for hogs.
3. After cleaning, keep all buildings, lots, and pastures free of hogs for 30-45 days.
4. Repopulate the farm with SPF hogs.
5. Maintain a closed herd.

#### OUTLAY FOR SPF BREEDING STOCK

This analysis assumes the farmer who is converting from conventional to SPF hog production is doing so with a group of 20 SPF gilts. Estimates of total outlay, labor inputs, and outlay for facilities are made for this number of gilts.

Three types of SPF replacements are used by farmers:

1. Four-week-old primary pigs obtained from a licensed laboratory.
2. Open secondary gilts from a certified SPF herd.
3. Bred secondary gilts from a certified SPF herd.

Prices paid for SPF breeding stock will vary (table 2). The prices paid for secondary gilts are affected by the supply of gilts relative to the demand for them and by the quality of the gilts. Prices paid for purebred SPF breeding stock are higher than prices paid for crossbreds. Also, gilts from a herd that has a good performance record, relative to rate of gain and thickness of backfat, will bring a higher price than gilts from herds with average or below average performance.

The total outlay for SPF breeding stock is almost the same for each kind of SPF gilt (table 3). The total outlay--price paid for the SPF gilts, value of feed fed to gilt until gilt is 8 months old, value of the labor inputs until gilt is 8 months old--is approximately \$100 for a primary pig, an open gilt, or a bred gilt.

Table 2.--Average price per head for SPF breeding stock, Iowa and Nebraska, 1961

Kind of replacement	SPF boars	Open SPF gilts <u>1/</u>
	<u>Dollars</u>	<u>Dollars</u>
Secondary stock:		
Purebreds (certified):		
Top quality -----	200	200
Good quality -----	100	100
Crossbreds (certified): <u>2/</u>		
Top quality -----	---	85
Average quality -----	---	75
Below average quality -----	---	65
Primary pigs: <u>3/</u>		
Lab fee -----	48	48
Loss on sow -----	---	4/ 10.33
Total -----	<u>5/</u> 48	58.33

1/ Open gilts are approximately 165 days old.

2/ Bred crossbred gilts cost an additional \$15 per gilt. Bred gilts are approximately 240 days old.

3/ Lab pigs are 4 weeks old.

4/ Loss on sow is the difference between the estimated value of a sow as a breeding animal and the salvage value of the carcass after the sow is killed by the hysterectomy. An average of 4 gilts are obtained per hysterectomy and the loss is prorated over this number of gilts.

5/ No charge is made for loss of sow on primary boar pigs. All charge is made to gilts because the usual policy is to destroy boar pigs at birth.

The higher initial price of older gilts over the price of the primary pigs is offset by a larger outlay for feed and labor to raise the primary pig to breeding age.

Table 3 shows cost of the feed required to raise a replacement gilt to the age of 8 months. The feed outlay will vary with the age of the SPF gilt. Primary pigs are fed for 7 months. Open gilts are fed 2-1/2 months. Bred gilts do not require additional feeding before they enter the breeding herd. Bred gilts are approximately 8 months old at the time of purchase.

Table 3. --Outlay per 8-month-old SPF gilt, Iowa and Nebraska, 1961

Item	Primary pigs	Secondary gilts	
		Open	Bred
	<u>Dollars</u>	<u>Dollars</u>	<u>Dollars</u>
Price paid for gilt -----	<u>1/</u> 58.33	75.00	90.00
Death loss <u>2/</u> -----	4.80	---	---
Boar cost <u>3/</u> -----	4.80	10.00	10.00
Value of feed -----	<u>4/</u> 26.41	<u>5/</u> 13.65	---
Value of labor <u>6/</u> -----	5.80	1.30	---
Total -----	100.14	99.95	100.00

1/ Includes \$48.00 for lab fee and \$10.33 for loss on sow.

2/ 7.6 percent death loss on primary pigs from the time pigs are brought to the farm to the time pigs enter the breeding herd at the age of 8 months.

3/ One boar per 10 sows.

4/ Feed for each gilt 4 weeks to 8 months old.

5/ Feed for each gilt 5-1/2 months to 8 months old.

6/ Labor charge--\$1 per man-hour.

Labor costs given in table 3 are those required to feed and care for each SPF gilt until the gilt becomes a part of the breeding herd. Primary pigs require 5.8 man-hours of labor to care for each gilt 4 weeks to 8 months old. Open secondary gilts require 1.3 man-hours of labor to care for each gilt 5-1/2 months to 8 months old.

Comparable labor inputs are not required for bred gilts. Bred gilts are ready to enter the breeding herd at the time of purchase.

Although the total outlay for primary pigs and secondary gilts is approximately the same, the uncertainties associated with the raising of primary pigs are possibly greater. Improper management would probably produce larger death losses with primary pigs than it would with secondary gilts. With primary pigs there is also the uncertainty of obtaining the number of gilts desired from any particular hysterectomy.

Primary pigs require extra planning. Because the hysterectomy must be performed 2 to 4 days before the sow is due to farrow her pigs naturally, accurate records



must be kept of breeding dates and the sow must be transported to the laboratory at the proper time.

The greatest advantage of primary pigs is that bloodlines and quality breeding are preserved in the new SPF herd. Hog producers who cannot purchase the bloodlines and quality they want in secondary stock can send sows with quality breeding to a laboratory for hysterectomies.

## THE CLEANUP

To prepare his farm for SPF hog production the farmer has two options. First, he can clean existing shelters and equipment before SPF breeding stock replacements are brought to the farm. Second, he can set up separate facilities to house SPF gilts or pigs, while the conventional herd is liquidated and the facilities formerly used by the conventional herd are cleaned.

The use of either method requires the farmer to perform the following operations on shelters, equipment, and lots formerly used by diseased hogs:

1. Remove all swine from the shelters and lots formerly used by diseased hogs 30-45 days before SPF replacements are to be brought to the farm.
2. Remove all sticks, stones, and objects not needed to care for hogs.
3. Remove all manure from the hog lot.
4. Drain and fill all mud holes and establish proper drainage.
5. Thoroughly clean the interiors of all buildings and the lower exterior surfaces of these buildings.
6. Scrub and clean all waterers and feeders.
7. Apply an antiseptic solution to all cleaned surfaces.

The cost of cleaning existing shelters and equipment can be very small. Unless the lots have to be graded and mudholes filled, the outlay is limited to labor inputs and disinfectants. Assuming that lots are adequate, thorough cleaning of shelters and equipment requires 2.2 man-hours of labor per SPF gilt. The cost of disinfectants and the operation of cleaning apparatus, such as steam cleaners, is \$0.50 per gilt.

The above outlay for labor and purchased inputs is probably a minimum outlay. Separate herds require more equipment. Maintaining both a conventional herd and a group of SPF breeding stock replacements will require additional outlays. Grading lots and filling mudholes will increase expenses. Furthermore, additional outlays may be necessary to renovate shelters and to repair fences and equipment formerly used by the conventional herd.

Table 4 gives the estimated outlay to provide separate facilities for SPF breeding stock replacements. The outlay to house 20 primary gilts is \$470. Twenty secondary gilts require an outlay of \$675. The above outlays include a charge for labor inputs.

Outlay for shelter and equipment per gilt is \$23.50 for primary pigs and \$33.75 for secondary gilts. The smaller primary pigs require less floor space initially than secondary gilts. When primary pigs become gilt size they can be shifted to cleaned facilities that were formerly used by conventional hogs.

Table 4.--Total outlay for materials, shelter, equipment, and labor to house 20 SPF hog replacements, Iowa and Nebraska, 1961

Item	Primary pigs	Secondary gilts	
		Open	Bred
	<u>Dollars</u>	<u>Dollars</u>	<u>Dollars</u>
Shelter -----	<u>1/</u> 200	<u>2/</u> 300	<u>2/</u> 300
Waterer -----	10	55	55
Feeder -----	25	85	85
Fencing <u>3/</u> -----	200	200	200
Other materials -----	15	15	15
Labor <u>4/</u> -----	20	20	20
Total -----	470	675	675

1/ 10 sq. ft. per pig at \$1 per sq. ft. of floor space.

2/ 15 sq. ft. per gilt at \$1 per sq. ft. of floor space.

3/ 50 rods of fence at \$4 per rod.

4/ 20 man-hours of labor at \$1 per hour.

Labor inputs are used for building fences, moving portable buildings into place, and for miscellaneous chores. One hour per gilt is required to set up separate facilities to house 20 SPF gilts.

The outlay given in table 4 is probably the maximum required by the farmer to house and care for a group of SPF pigs or gilts. Shelter for SPF pigs and gilts can be found in existing buildings on most farms. Usually any shelter that will keep pigs dry and protect them from the elements is adequate. Farmers often have extra fencing materials, feeders, and waterers suitable for use with SPF breedingstock. Not much extra equipment would be required.

Farmers can move conventional hogs to another farm to be finished and sold, in lieu of maintaining two herds on the same farm. The farmer can then clean up in preparation for SPF production the facilities formerly used by conventional hogs.

A farmer may rent facilities on another farm for SPF breeding stock in lieu of setting up two sets of facilities on his own farm. An ideal location may be a nearby farm on which no hogs have been produced for a number of years. The cleanup in preparation for bringing SPF breeding stock to such a farm could be relatively simple. Furthermore, the increased distance between SPF and conventional hogs would reduce the danger of having SPF hogs infected with diseases.

## LOSS IN INCOME

In converting from conventional to SPF hog production, the income he must forego concerns the farmer. In cleaning up the farm for SPF hog production all conventional hogs are sold and the lots and shelters remain vacant for a period of 30-45 days. This interruption of hog production deprives a farmer of the income he would earn from his hogs if production had continued in the usual way.

A farmer can reduce or eliminate foregone income in two ways. He can (1) purchase older gilts ready for breeding or farrowing, or (2) maintain two herds until the SPF herd is ready for full production.

The age of the replacement gilts directly affects time out of production. When primary pigs are used, along with one set of housing and equipment, to repopulate farms, it is 18 months from the time that the last group of conventional hogs is marketed until the first group of SPF hogs is ready for market. Repopulating farms with open secondary gilts will reduce the time when the farmer is out of hog production to 12 months. Repopulation with bred secondary gilts reduces the time out of production to 10 months.

It is possible to express lost production in terms of litters not farrowed. When primary pigs are used as breeding stock replacements, two litters of conventional pigs per sow are not farrowed because of interrupted hog production. With secondary gilts only one litter per sow is missed because of interrupted production.

A farmer who maintains separate herds of SPF gilts and of conventional hogs eliminates the loss in income from curtailed hog production, but his other costs increase. Additional shelters and equipment are necessary. Furthermore, the farmer will have to exercise extreme care to prevent the transmission of disease from conventional market hogs to the SPF breeding stock.

The profitability of the conventional hog enterprise determines whether a farmer should dispose of all his hogs before starting an SPF herd. The more profit he is making the greater the loss in income when he curtails production. When the loss in income exceeds the outlay for additional facilities, the farmer may find it desirable to provide the additional facilities to house SPF breeding stock replacements.

When primary pigs are used as replacement breeding stock the break-even profit for the conventional system is \$1.63 per market hog. <sup>2/</sup> With a profit less than \$1.63 per market hog under the conventional system, a farmer may find it more desirable to curtail all hog production. When profit per market hog is larger than \$1.63 the farmer should consider maintaining two herds--SPF and conventional--during the conversion period.

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<sup>2/</sup> Two litters per sow in the conventional breeding herd are not farrowed when primary pigs are used to convert to SPF hog production. This amounts to foregone profits from 14.4 market hogs. If production of conventional hogs had continued without interruption, these profits would have been available to the farmer.



When secondary gilts are used for replacement stock, the break-even profit for the conventional system would be \$4.67 per market hog produced. <sup>3/</sup> If profit from each hog marketed from the conventional system is \$4.67 or more, additional facilities should be constructed to house two herds--SPF and conventional--during the conversion period. When profits fall below \$4.67 per market hog it is best to liquidate the conventional herd and suspend all hog production during the cleanup.

Losses in income from interrupted hog production, and outlay for shelter and equipment per SPF replacement, are estimated on the basis of each sow in the herd. At the break-even profit, the loss in income per sow in the conventional sow herd during the conversion period equals the outlay for buildings and equipment to replace each sow in the conventional herd.

Conventional sows are assumed to produce two litters a year, with 7.2 hogs marketed per litter. Also it is assumed that the farmer will maintain the same size of sow herd after converting to SPF hog production as before. (For other assumptions applicable to conventional hog production see appendix tables 7 to 9.)

### CONVERSION ALTERNATIVES

Methods to convert to SPF hog production are defined by the kind of SPF breeding stock acquired and the method of cleanup. The use of a particular kind of SPF replacement with a particular method of cleanup determines the outlay to finance the shift from conventional hog production to SPF hog production. The following alternatives are considered representative of those now chosen by farmers in converting from conventional hog production to SPF hog production:

1. Primary pigs, 4 weeks old; one set of cleaned shelters and equipment.
2. Primary pigs, 4 weeks old; a separate set of shelters and equipment for SPF breeding stock replacements.
3. Open gilts, 5-1/2 months old; one set of cleaned shelters and equipment.
4. Open gilts, 5-1/2 months old; a separate set of shelters and equipment for SPF breeding stock replacements.
5. Bred gilts, 8 months old; one set of cleaned shelters and equipment.
6. Bred gilts, 8 months old; a separate set of shelters and equipment for SPF breeding stock replacements.

Production, costs, and net returns are estimated on the basis of each sow. Estimates are made on the supposition that two litters per sow are farrowed annually. Returns are estimated on the basis of hogs selling at \$17 per hundredweight. Assumptions presented in appendix table 7 are the basis for computing foregone income (table 5) and net returns (table 6).

Table 5 gives the estimated cash outlays and labor inputs per sow to convert to SPF hog production. The total outlay to convert to SPF hog production can be calculated by multiplying the estimated cash outlay and labor inputs by the number of sows formerly kept as brood sows.

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<sup>3/</sup> One litter per sow in the conventional breeding herd is not farrowed when secondary gilts are used to convert to SPF hog production. This amounts to foregone profits from 7.2 market hogs. If production of conventional hogs had continued without interruption, these profits would have been available to the farmer.



Table 5.--Total outlay to convert to SPF hog production: Cost per sow in SPF herd by kind of replacement and equipment component, Iowa and Nebraska, 1961

Alternatives	Cost of : Investment:		Miscel- :		Loss :		Total :	
	SPF :	in shelter :	Outlay :	laneous :	in :	outlay :	Total :	labor
	replace- :	and :	for :	cost of :	net :	(less labor :	costs) :	
	ment :	equipment :	feed :	cleanup :	income :			Man-hours
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	
Primary pigs using original build- ings and equipment -----	1/ 67.93	---	26.41	0.50	107.06	201.90		8.0
Primary pigs using separate build- ings and equipment for SPF replacements -----	1/ 67.93	22.50	26.41	.50	---	117.34		9.0
Open gilts, 5-1/2 months old, using original buildings and equipment -	2/ 85.00	---	13.65	.50	53.53	152.68		3.5
Open gilts, 5-1/2 months old, using separate buildings and equipment : for SPF production -----	2/ 85.00	32.75	13.65	.50	---	131.90		4.5
Bred gilts, 8 months old, using original buildings and equipment -	3/ 100.00	---	---	.50	35.33	135.83		2.2
Bred gilts, 8 months old, using separate buildings and equipment : for SPF replacements -----	3/ 100.00	32.75	---	.50	---	133.25		3.2

- 1/ Lab fee \$48, loss on sow \$10.33, proportion of herd boar allotted to each gilt \$4.80, \$4.80 death loss.  
2/ Average quality open crossbred gilt \$75, plus \$10 proportionate cost of SPF herd boar allotted to each gilt.  
3/ Average quality bred crossbred gilt \$90, plus \$10 proportionate cost of SPF herd boar.

Table 6.--Feed costs and net returns per market hog for conventional hogs with different feeding efficiencies and SPF hogs 1/

Feeding efficiency	Total feed costs	Total net returns <u>2/</u>	Gains in net re- turns from SPF hogs over con- ventional hogs
	<u>Dollars</u>	<u>Dollars</u>	<u>Dollars</u>
Conventional:			
400 lb. of feed per cwt. of production -----	19.41	8.38	---
450 lb. of feed per cwt. of production -----	21.86	5.99	2.18
500 lb. of feed per cwt. of production -----	24.33	3.15	5.02
550 lb. of feed per cwt. of production -----	27.34	.54	7.63
Specific pathogen free (378 lb. of feed per cwt. of production) <u>3/--</u>	19.95	8.17	---

1/ Costs and returns for SPF and conventional hog production are based on assumptions given in appendix table 7. Increasing quantities of feed per hundredweight of production for conventional hogs are attributable to the buildup of virus pig pneumonia and atrophic rhinitis in the herd. The buildup of disease brings about slow growth, longer feeding periods, and declining efficiency.

2/ Returns to labor and management. Assumed price of market hogs \$17 per hundredweight.

3/ Includes feed for the breeding herd.

Table 5 indicates that the use of primary pigs with one set of shelters and equipment will place the greatest financial burden (not including labor costs) upon the farmer. The cost is lowest when primary pigs are used with two sets of shelters and equipment. When labor costs are included the costs of primary pigs with two sets of shelters and equipment are almost the same as the cost of using bred gilts with either one or two sets of facilities.

#### WHO SHOULD ADOPT SPF HOG PRODUCTION

Both purebred and commercial hog producers may find SPF hog production profitable. Hog producers who have had substantial losses in production efficiency because of atrophic rhinitis and virus pig pneumonia can clean up their operations and increase profits.

SPF hogs have demonstrated that they improve feeding efficiency, but the individual farmer should compare the feeding efficiency of his conventional herd with the expected feeding efficiency from SPF hog production before switching to the SPF program. The feeding efficiency of healthy conventional pigs may compare favorably with that of SPF hogs. If reduced feeding efficiency of conventional hogs is attributable to atrophic rhinitis and virus pig pneumonia, SPF hog production is a profitable move.

Table 6 gives the estimated gains in net returns possible by converting to SPF hog production.

The feeding costs and net returns for conventional hogs which require 400 pounds of feed per hundredweight of production are comparable to those of SPF hogs. However, as the quantity of feed required per hundredweight of production for conventional hogs increases, feed costs also increase. The greater the feed costs incurred by conventional hogs the greater the possible gains from SPF hog production.

Gains resulting from the switch from conventional hogs to SPF hogs are measured in increased net returns per hog marketed (table 6). When feed required per hundredweight of conventional hog is 450, 500, or 550 pounds, the feed costs per hog marketed are \$21.86, \$24.33, and \$27.34, respectively. Feed cost per SPF hog is \$19.95. Gains in net returns per SPF hog marketed over a conventional hog by feed conversion ratio are \$2.18, \$5.02, and \$7.63 respectively.

It is possible to make a comparison of SPF production to conventional production in another way. Assuming a given outlay for feed, a larger number of SPF hogs than of conventional hogs can be finished to market weights on it. If conventional hogs require 450 pounds of feed per hundredweight of production, the same outlay of feed for SPF hogs will increase the number of hogs marketed 9.5 percent. When conventional hogs require 500 to 550 pounds of feed per hundredweight of production, the number of hogs marketed for a given outlay of feed will increase by 22 and 37 percent respectively with the switch to SPF hog production.

Even with good management practices in the production of conventional hogs, a high incidence of disease often reduces their feeding efficiency. The greater the effect of disease on the feeding efficiency the less the financial burden on the farmer to convert to SPF hog production. If feed costs are high for conventional hogs because of disease, conversion to SPF hogs may become a redirection in the use of labor. Labor inputs formerly used in caring for pigs in a profitless or almost profitless hog enterprise are used instead to clean up a farm for SPF hog production.

# APPENDIX

Table 7. -- Assumed annual production, costs, and net returns per litter for Specific Pathogen Free and conventional hog production, Iowa and Nebraska, 1961 1/

Item	Unit	Type of hog production	
		Specific	Conventional
		Pathogen Free	
<u>Production</u>			
Hogs marketed per litter -----	Number	8.2	7.2
Total production-----	Cwt.	17.6	15.6
Total value <u>2/</u> -----	Dollar	299.20	265.20
<u>Costs</u>			
Feed -----	do.	175.30	157.60
Shelter and equipment expense ---	do.	34.05	34.05
Interest on investment in breed- ing stock -----	do.	7.74	6.67
Miscellaneous -----	do.	15.23	13.38
Total cost -----	do.	232.32	211.70
Cost per hundredweight of live- stock marketed -----	do.	13.20	13.57
<u>Net returns <u>3/</u></u>			
Total -----	do.	66.88	53.50
Net returns per hundredweight of live weight marketed -----	do.	3.80	3.43

1/ Per litter costs estimated on the basis of 20 sows farrowing twice per year.

2/ Price of market hogs is \$17 per hundredweight.

3/ Returns to labor and management.

Table 8. --Feed fed to SPF hogs per litter

Feeding period	Days fed	Corn fed	Supplement fed	Creep feed and grower fed	Total feed fed
	<u>Number</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
Breeding animals before breeding -----	32	411	66	---	477
Gestation period -----	113	458	84	---	542
Lactation period -----	35	308	94	160	562
Growing-finishing -----	128	4, 272	582	227	5, 081
Total -----	308	5, 449	826	387	6, 662

Table 9. -- Feed fed to SPF and conventional hogs per hundredweight of production  
(includes feed for breeding herd)

Feed	SPF hogs	Conventional hogs <u>1/</u>
	<u>Pounds</u>	<u>Pounds</u>
Corn -----	309	370
Supplement -----	47	40
Pig creep and grower -----	22	8
Total -----	378	418

1/ Derived from R. H. Bauman and L. M. Eisgruber, Cost and Profits in Hog Production, Economic and Marketing Information, Purdue University, May 31, 1961, and R. Partenheimer, The Effects of Size of Enterprise on Cost and Returns From the Two Litter System of Hog Production on Selected Central Indiana Farms, 1957, unpublished M. S. thesis, Purdue University.



