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Agricultural
Research
Training
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Project**

ECONOMIC ANALYSIS OF HOG PRODUCTION

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BAHAMAS AGRICULTURAL
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Economic Analysis of Swine Production
On North Andros Island, Bahamas

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The aim of the Bahamas Agricultural Research, Training and Development Project is to find ways to provide a stable and economically viable commercial agriculture in the Bahamas based on family type farms. Increased agricultural output will provide jobs and decrease the large proportion of the food supply which must be imported annually. The BARTAD Project is a joint effort between the governments of the Commonwealth of the Bahamas and the United States. A major thrust of the research effort has been toward livestock and meat production.

Swine production on Andros could be one of the more important livestock enterprises. The consumer demand study has indicated that Androsians eat more pork than any other red meat. It is more available locally than other red meats because of the number of swine kept in back yard pens. In addition 57 percent of the people purchase frozen pork. Pork ranks second to chicken as a favorite meat of Androsians. The price and supply of pork, especially fresh pork, influences the amount used on the island.

If pork production is to increase on the island, swine must be economically feasible in the enterprise mix. Farmers will want a reasonable return per hour of labor from the swine enterprise.

Like other livestock enterprises, there are many factors that will influence profitability. Probably the foremost factor will be feed cost. Feed can be imported or produced on Andros. If imported, the cost to the farmer will depend on how efficiently the feed can be transported and the current prices in the exporting country. A farmer's cooperative has been set up on North Andros and is importing hog feed. It is essential that a good supply of feedgrains are available to produce swine as compared to beef, sheep or goats that can be produced on pasture. Several crops of corn and sorghum have been produced at BARTAD. Research to date indicates that low yields and high input costs, as shown in budgets later in the report, will make the cost higher than for imported grain.

A second factor is the management level attained in the swine enterprise. The budget for average management assumes twice a year farrowing with 7.5 pigs per litter weaned for a total of 15 pigs per sow per year. The hog operation on the BARTAD pilot test farm has averaged nearly 10 pigs per litter with confinement farrowing for 12 litters. The U.S. average litter size is between 7.5 pigs and 8.0 pigs weaned per litter. However, breeding problems on the pilot test farm have resulted in less than twice a year farrowing thus far. Production during the period of September, 1976 through July, 1977 was at a rate of 11.7 pigs per sow per year. This should increase as the breeding problems are solved. A great deal of management assistance was provided by BARTAD personnel. Also, the farmer was motivated and more experienced with hogs than might be typical on Andros.

A major factor influencing profitability will be the price received for pork. As long as all hogs can be marketed on Andros, the price will probably be high

enough to be profitable. However, the market on Andros is limited. With the present population of about 5000 people on North Andros, there will be a possible market for 600 to 800 hogs per year. Once this is supplied, additional hogs will have to be marketed off the island. Hogs could be shipped to Nassau live for slaughter or a processing facility could be built on Andros. If competing meats are lower priced, chances are that Androsians will not increase their consumption of pork. If the price is too low, the chance of making reasonable profits will be questionable, especially with the high price of inputs.

Only limited data are available at BARTAD on the inputs and outputs necessary to determine the economic feasibility of swine production. The only data is from one pilot test farm on which hogs were placed in October, 1976. These were imported high quality, crossbred, predominantly Yorkshire sows and gilts.

The system used was a semi-confinement system with confinement farrowing in farrowing stalls. Pasture was used for breeding, maintaining sows during gestation and for finishing market animals. The farmer was experienced with small scale swine production. He devoted a great deal of time and effort to the swine enterprise.

Building materials for confinement buildings are expensive. Also a high level of management expertise is required. For these reasons it was decided that a pasture farrowing system would be easier and less expensive for an average farmer. These budgets assume a pasture farrowing system with hogs farrowed and raised to slaughter weight on the farm. A farmer also has two other alternatives. He can sell feeder pigs from his sows at 40 pounds each or he can buy feeder pigs from another farmer instead of keeping sows. If production is divided in this manner, feeder pig prices should be determined based on production costs and prices for market hogs.

Seldom is it possible to construct a budget that will be applicable to all farmers under all conditions. The budget analysis for swine is strictly a guide as to the economic potential under a given set of circumstances. In this report, a budget is first presented based on average management levels and local marketing (Table 3). This reflects the profitability of swine production under present conditions. The data in the budgets are subject to wide fluctuations based on current price situations for inputs, outputs and management levels of farmers. In later sections, an attempt is made to show the influence of lower management levels and higher input prices on profitability (Table 4). Also, marketing in Nassau, changing the feeding program, and producing feedgrains on Andros are discussed.

Capital Investment and Annual Costs

A Bahamian farmer starting in the hog business with 8 sows on a pasture system would need an initial investment of \$9,115 for building, equipment, fencing and livestock. Fences are the largest cost item at \$.75 per foot including labor. The cost of labor is also included for the portable farrowing buildings. A farmer could reduce his cash costs by building fences and buildings. He would then have an opportunity cost for his labor, which may be less than hired labor costs during slack periods.

Table I. Capital Investment Required - Total for 8 sows and Per Sow

	<u>Total</u>	<u>Life</u> <u>Years</u>	<u>Depr.</u>	<u>Interest</u> <u>12% x</u> Ave. Invest. ($\frac{1}{2}$ new cost)	<u>Repairs</u> <u>2.5% x</u> New Cost	<u>Total</u>
<u>I. Facilities</u>						
1. Fencing	\$3750	10	\$375	\$225	\$ 94	\$ 694
2. Gates	640	10	64	38	16	118
3. Farrowing Buildings (4)	515	10	52	31	13	96
4. Shades	<u>192</u>	10	<u>19</u>	<u>12</u>	<u>5</u>	<u>36</u>
Total Facilities	\$5097		\$510	\$306	\$128	\$ 944
<u>II. Equipment</u>						
1. Watering System	\$1000	5	\$200	\$ 60	\$ 25	\$ 285
2. Feeders	<u>318</u>	5	<u>64</u>	<u>19</u>	<u>8</u>	<u>91</u>
Total Equipment	\$1318		\$264	\$ 79	\$ 33	\$ 376
<u>III. Livestock</u>						
1. Sows (8)	\$2400	-	-	\$288	-	\$ 288
2. Boar (1)	<u>300</u>	-	-	<u>36</u>	-	<u>36</u>
Total Livestock	\$2700			\$324		\$ 324
Total - 8 sows	\$9115	-	\$773	\$709	\$161	\$1644
Total Fixed Cost Per Sow	\$1139	-	\$ 97	\$ 89	\$ 20	\$ 205

Average Management Levels and Local Marketing

Based on BARTAD experience, a farmer with average management ability should be able to sell an average of 7.5 pigs per litter or a total of 15 pigs annually per sow less replacements. Local demand for 180- to 220-pound slaughter hogs has been acceptable at \$80 per hundred pounds live weight. A market weight of 210 pounds is assumed in this budget. In the past, hogs had been slaughtered at lighter weights because they put on fat when carried to heavy weights. This problem has been reduced with the improved breeding stock and feeding program introduced at BARTAD.

Local marketing is done by hauling the carcasses to local settlements by truck once per week. Then a local person or the farmer himself peddles the meat

door-to-door. Local agents charge \$0.10 per pound live weight to do the peddling. The distance between the farm and the settlements where marketing has been most active, Nicoll's Town and Mastic Point, is 15 miles. Assuming two carcasses per load, mileage driven is about 30 miles per round trip or 15 miles per carcass. The cost of operating a farm truck is estimated at \$0.20 per mile for a transportation cost of \$3.00 per carcass.

Good alfalfa pasture will supply up to 50 percent of the feed requirements of the breeding herd between breeding and farrowing and up to 15 percent of the feed requirements for fattening hogs. A one-year stand life was assumed for the pasture. The pastures on the first hog farm were destroyed in six months under continuous grazing. Under proper rotation a life of two years should be possible. Purchased feed requirements have been based on studies of U. S. pasture systems and some estimates of feed conversions in the tropics.

Table 2. Cost of Producing Alfalfa Pasture Per Acre Seeded Every Year

	<u>Quantity</u>	<u>Rate</u>	<u>Value</u>
I. Seed - Alfalfa	20 lb.	1.02	\$ 20.40
II. Fertilizer - 8-18-8	.5 T	205.00	102.50
0-46-0	.15 T	178.00	26.70
III. Machine Use (includes labor)			
Disking (twice)	1.0 hr.	18.82	18.82
Fertilizing	.15	17.84	2.68
Seeding	1.2	16.36	19.63
IV. Other labor	0.5 hr.	2.00	1.00
V. Rent	1 Acre	26.00	26.00
VI. Interest on investment 217.73 x 12%			<u>26.20</u>
Total Annual Cost Per Acre			\$243.93

Sows are replaced in the breeding herd every $2\frac{1}{2}$ years. Operating costs and feed requirements are largely taken from data on U. S. pasture systems due to the very limited data from BARTAD. The feed prices charged by the farmer's cooperative are about 20 percent over Miami prices to cover transportation and overhead.

The total annual cost of a sow and two litters is \$2197. With income of \$2541, the return to labor and management is \$344. Labor requirements are estimated to be 50 percent higher than actual labor requirements on swine farms in the United States because of lesser experience of the Bahamian farmer with swine and the smaller-sized herd. With 48 hours of labor required, the returns per hour are \$7.16 (Table 3).

If these price relationships and performance levels can be maintained, producing market hogs for the local market will be profitable. The price can fall to \$72 per hundred pounds and still cover all costs including a \$2.00 per hour return to labor and management.

The sale of good quality breeding stock could bring in additional income to the hog farmer, at least while hog production is expanding. There has been interest expressed for breeding animals at prices somewhat higher than slaughter prices, both on Andros and on other islands.

Table 3. Swine Budget, Sow and Two Litters, Average Management, Local Marketing at \$80 per Hundred Pounds Live Weight

	<u>Quantity</u>	<u>Rate</u>	<u>Value</u>	<u>Total</u>
I. <u>Income</u>				
1. Sale of market hogs	14.6 x 2.1 cwt.	\$80/cwt.	2452.80	
2. Sale of cull sow	.4 x 4 cwt.	\$55/cwt.	<u>88.00</u>	
3. Total Income				\$2540.80
II. <u>Variable Costs</u>				
1. <u>Operating</u>				
a. Breeding			15.00	
b. Vet, drugs & supplies			<u>20.00</u>	
Total Operating				\$ 35.00
2. Feed (grain purchased from cooperative) ^{a/}				
a. Pig starter (to 40 lb)	4. cwt.	\$ 13.20	52.80	
b. Hog grower (to 125 lb)				
3.38 lb/lb. gain	43. cwt.	12.90	554.70	
c. Hog finishing feed (to 210 lb)				
3.38 lb/lb. gain	43. cwt.	12.70	546.10	
d. Breeding herd feed	28 cwt.	12.70	355.60	
e. Pasture (from Table 4)	0.4 acre	243.93	<u>97.57</u>	
Total Feed				\$1606.77
3. Local Marketing Costs				
a. Transportation to local settlements				
\$3.00 per carcass x 14.6			43.80	
b. Fee to local marketing agent				
\$0.10/lb. live x 210 lb. x 14.6			<u>306.60</u>	
Total Local Marketing Costs				\$ 350.40
Total Variable Costs				\$1992.17
III. <u>Fixed Costs</u>				
Total Fixed Costs (From Table 1)				\$ 205.00
Total Costs (except labor)				\$2197.17
Return to Labor & Management ^{b/}				\$ 343.63

^{a/}These prices are from April, 1977. Since that time protein prices have risen due to short supplies in the U. S. These prices reflect expected prices in the long run.

^{b/}A return to labor and management of \$7.16 per hour.

Below Average Management and Five Percent Increase in Feed Prices

The management levels attained and the feed prices will have a major affect on the profitability of the hog enterprise. If litter size is reduced, the costs of maintaining the sow and fixed costs per pig sold are increased. A reduction of litter size to seven pigs per litter decreases net returns by \$58 per sow.

Feed costs are over 85 percent of total costs in this budget. A five percent increase in prices for purchased feed will increase costs by about \$80 per sow. An increase in feed required could have the same effect. Decreasing litter size to seven pigs per litter and increasing feed costs by five percent decreases returns for labor and management to \$228.82 per sow with local marketing (Table 4).

Table 4. Swine Budget, Below Average Management, Local Marketing, 5 percent increase in feed prices

	<u>Quantity</u>	<u>Rate</u>	<u>Value</u>	<u>Total</u>
I. <u>Income</u>				
1. Sale of market hogs	13.6 x 2.1 cwt.	\$80/cwt.	2284.80	
2. Sale of cull sow	.4 x 4 cwt.	55/cwt.	<u>88.00</u>	
Total income				\$2372.80
II. <u>Variable Costs</u>				
1. Operating				\$ 35.00
2. <u>Feed</u>				
a. Pig Starter (to 40 lb.)	3.75 cwt.	\$13.86	51.97	
b. Hog Grower (to 125 lb.)	40 cwt.	13.54	541.60	
c. Hog Finishing Feed (to 210 lb)	40 cwt.	13.33	533.20	
d. Breeding Herd Feed	28 cwt.	13.33	373.24	
e. Pasture (From Table 4.)	0.4 Acre	243.93	<u>97.57</u>	
Total Feed				\$1597.58
3. <u>Local Marketing Costs</u>				
a. Transportation to local settlements				
\$3.00 per carcass x 13.6			40.80	
b. Fee to local marketing agent				
\$0.10/lb. live x 210 lb. x 13.6			<u>285.60</u>	
Total Marketing Costs				\$ 326.40
Total Variable Costs				\$1958.98
III. <u>Fixed Costs (From Table 1.)</u>				
Total Costs (except labor)				205.00
Return to Labor and Management ^{a/}				\$2163.98
				\$ 228.82

^{a/}A return to labor and management of \$4.77 per hour for 48 hours per sow.

Hogs Marketed in Nassau

Once the local market is supplied, any additional hogs will have to be marketed in Nassau. There is no government licensed slaughtering facility on Andros, so hogs would have to be shipped live to the government abattoir. Transportation costs will be high. A small number of hogs can be shipped by mailboat. If sufficient volume could be produced, a barge could be chartered.

The market for pork in Nassau is large. About half of the total Bahamian population, plus tourists, live in Nassau. The Bahamas imported 8,735,200 pounds of pork in 1974. Imported pork is mainly the higher priced cuts such as loins, cured hams and sliced bacon.

The abattoir slaughters about 400 locally produced hogs per month. These are usually killed at under 100 pounds. The meat is sold by local butchers as fresh pork. There are several possible reasons for the light slaughter weights rather than the 200-220 pounds in most other areas of the world. Some pigs are raised mainly on garbage and grow slowly. A 100-pound pig may be six months old. The meat may become less tender as the animal ages under these conditions. Traditional breeds of hogs may put on excess fat beyond 100 pounds. This fat is wasted when the pork is sold fresh. There are no processing facilities presently in the Bahamas for curing and smoking hams and shoulders or rendering lard. An implicit assumption at BARTAD has been that hogs bred for meaty characteristics and fed a balanced diet would be acceptable on the Nassau fresh pork market at heavier weights.

A government-subsidized mailboat, the Miss Beverly, makes a weekly trip to Nassau from North Andros. A livestock shipping trailer was built by BARTAD to be pulled behind a truck and backed onto the mailboat for shipping to Nassau. The hogs can be hauled from the dock to the abattoir in the trailer which would then be returned to Andros.

One shipment of 220-pound hogs was sent to Nassau in August, 1977 to test the market. The hogs were loaded onto the livestock trailer and shipped by mailboat. The hogs sold for \$0.70 per pound dressed weight or \$0.40 per pound live weight. The dressing percentage, which included shrinkage during shipping, was 64 percent. The prices and marketing costs are summarized in Table 5.

Unless feed costs can be substantially reduced or the market price raised, marketing as fresh pork in Nassau does not look very profitable. A higher price per pound can be obtained with 100-pound hogs. However, the production cost per pound rises very sharply as hogs are sold at lighter weights. A major cost item in pork production is the cost of maintaining the sow and raising hogs to 100 pounds. The cost of finishing to 200 pounds is low by comparison. The production costs are spread over fewer pounds at the lighter weights, increasing cost per pound substantially.

A small processing plant in Nassau might allow better utilization of large hogs. However, the cost of processed pork would probably be much higher than imports. Also, the shoulders and other cuts would have to be sold at a lower price than imports which are mainly more desirable loins and hams.

Table 5. Sale Value, Marketing Costs, and Net Value to Farmer With Hogs Marketed in Nassau

1.	Average weight of hogs live on Andros 220 lb.			
2.	Average weight of hogs dressed at abbatoir 141.5 lb.			
3.	Dressing percentage ^{a/} $141.5 \div 220 = 64$ percent.			
4.	Sale price-dressed \$0.70 per lb.			
5.	Sale price - converted to live weight $\$0.70 \times 64\% = \0.45 per lb.			
		<u>Per Load</u>	<u>Per Pound</u>	<u>Per Hog</u>
6.	Sale value per hog 141.5 lb @ \$0.70			\$99.05
7.	Transportation Costs			
	a. Cost of shipping trailer on mailboat	\$50.00		
	b. Cost of transportation farm - dock 2 round trips (1 to deliver trailer, 1 to retrieve) 2 x 30 miles x \$0.20 per mile	12.00		
	c. Labor for loading ^{b/} 3 men x 3 hrs. x \$2/hr	\$18.00		
	d. Phone calls ^{c/} 4 @ \$1.80	7.20		
	Total Cost Per Load	\$87.20		
8.	Capacity of Trailer 8 hogs.			
9.	Transportation Cost Per Hog (with full load)			\$10.90
10.	Net Value to Farmer - Per Hog Per Pound Live Weight $\$88.15 \div 220 \text{ lb} = \0.40			
11.	Transportation cost per hog with partial load (4hogs) \$21.80			
12.	Reaction of butcher - pleased with general appearance of hogs but negative about size and fat.			

^{a/} Includes shrinkage which is probably high due to long 3 day period between shipping start and slaughter.

^{b/} Loading into trailer and weighing took 1½ hrs. Loading onto mailboat took ½ hr., but involved 1 hr. idle time at dock. Fifteen men actually assisted in loading trailer onto boat.

^{c/} Eleven phone calls were actually made but this number could be reduced once the shipping is better organized.

Finishing Hogs on Shelled Corn and Supplement Rather Than a Complete Mixed Ration

Feed costs for finishing hogs may be reduced slightly by feeding imported shelled corn and protein supplement rather than a complete mixed ration. The grinding and mixing charge by the feed supplier would be eliminated. This saving was estimated during spring and summer, 1977 and appeared to range between \$0.75 and \$1.50 per hundredweight of mixed feed bagged and palletted for export.

Corn and supplement can be fed without loss compared to mixed feeds to hogs over 100 pounds. In a self feeder, one hole for supplement and five holes for corn should be provided. The pigs will balance their own protein and energy needs. In case the supplement is very poor quality the pigs will not consume enough. To guard against poor quality supplement, it is desirable to buy from a reputable feed company.

The reduction in feed cost with shelled corn and supplement fed to hogs between 100 and 210 pounds, at a price reduction of \$1.00 per hundredweight, would be \$55.77 per sow (Table 5). However, this would be a further complication of the farmer's management problems. Mixed feed would be necessary for the breeding herd and young market animals. Two separate feed inventories would be necessary. More feeders would be needed. It is doubtful that the feed savings would be worth the extra management problems involved with a 10 to 20 sow operation.

Table 6. Calculation of Feed Cost Savings Feeding Imported Shelled Corn and Supplement Instead of Mixed Feed to Market Hogs, 100 to 210 Pounds, Per Sow, Andros, Bahamas

Pigs Per Sow	15
Pounds Gain Per Pig, 100 to 210 Pounds	1.1 cwt.
Conversion Ratio 3.38 Pounds Feed Per Pound Gain	
Feed Required Per Sow 15 x 1.1 cwt. x 3.38	55.77 cwt.
Estimated Feed Cost Savings Per Hundredweight	\$ 1.00/cwt.
Estimated Feed Cost Savings Per Sow	\$55.77

Feed Grain Production on Andros

Feed grains can be produced on Andros, but low yields and high input costs will make the cost higher than for imported grain. One crop has been produced during the dry season using irrigation. Yields were 40 to 70 bushels per acre. The budgets assume that crops are grown during the wet season when irrigation is not needed (Tables 7 and 8).

The expenses and labor for raising corn and sorghum are the only items included in the budget. Income figures have been omitted, since the grain will be marketed through the hogs. It would be questionable whether either crop could be competitive as a cash crop when compared to fruits or vegetables.

With a 60-bushel per acre yield, the cost of producing corn is \$5.20 per bushel. The price of corn bagged and palletted for export in August, 1977 was

\$3.28 per bushel. With a 20 percent transportation and overhead charge, the cost on Andros would be \$3.94 per bushel. Unless yield can be increased dramatically or costs of production can be decreased, it is doubtful that feed grain production will be feasible. Downy mildew became a problem on corn during the summer of 1977. Resistant varieties must be developed before much improvement in yield can be expected. Feed grain production may be feasible in rotation with winter vegetables where residual fertilizer from the vegetables supplies the needs of the corn.

Labor costs were not included in the budget. If the hours of labor required to produce an acre of corn are assumed to be 12 at \$2 per hour it would raise corn production costs 40 cents per bushel. Labor requirements are assumed to be 2-3 times the requirements on U. S. farms.

The cost of producing a bushel of sorghum, without labor included, is \$4.78 per bushel (Table 8). The substitution rate of sorghum for corn fattening is 91 percent. This means that corn would be a better crop to grow in the Bahamas as swine feed than sorghum at these production costs.

Feed grain grown on Andros could replace corn in the ration, leaving protein supplement as the only imported feed needed. Approximately 84 percent of total feed or 96 hundredweight of purchased feed could be replaced with homegrown corn. The cost of imported corn for a sow and two litters, including the cooperative markup, would be \$675. Corn grown on Andros would cost \$891. This would reduce the return to labor and management to \$40 under average management and local marketing.

Table 7. Corn Production Costs

	<u>Unit</u>	<u>Quantity</u>	<u>Price</u>	<u>Cost</u>
<u>Expenses</u>				
Seed	lb.	12.0	\$.50	\$ 6.00
Fertilizer - 8-18-8	cwt.	12.0	10.30	123.60
Pesticides (3 sprays)	Acre	3.0	8.00	24.00
Tractor Use	Hr.	7.5	10.00	75.00
Machine Use	Hr.	7.5	3.00	22.50
Harvest & Hand	Acre	1.0	20.00	20.00
Interest on Pre-Harvest				
Expenses 6 months	\$251.10 x $\frac{1}{2}$		12%	15.07
Land Rental	Acre	1.0	26.00	<u>26.00</u>
Total Expenses				\$312.17
Cost/Bu. @ 60 Bu. Yield				\$ 5.20

Table 8. Sorghum Production Costs

	<u>Unit</u>	<u>Quantity</u>	<u>Price</u>	<u>Cost</u>
<u>Expenses</u>				
Seed	lb.	12.0	.5	\$ 6.00
Fertilizer 8-18-8	cwt.	12.0	10.3	123.60
Tractor Use	hr.	7.5	10.	75.00
Machine Use	hr.	7.5	3.	22.50
Harvest & Hand	Acre	1.0	20.	20.
Interest on Pre Harvest				
Exp. 6 months	\$227.1 x $\frac{1}{2}$		12%	13.63
Land Rental	Acre	1.0	26.	26.00
Total Expenses				\$286.73
Cost Per Bu. @ 60 Bushel Yield				\$ 4.78

Table 9. Returns Per Sow Under Different Levels of Management, Feed Sources and Prices, and Marketing Methods

Average Management, Local Marketing, Current Feed Costs	\$343.63
Below Average Management, Local Marketing, Five percent Rise in Feed Costs	228.82
Average Management, Local Marketing, Shelled Corn & Supplement Fed to Market Hogs	399.40
Average Management, Local Marketing, Corn Grown on Andros	127.63
Average Management, Nassau Marketing at 200 Pounds, Current Feed Costs	-970.77

SUMMARY

Swine production can be a profitable enterprise if a reasonable level of management can be attained. Purchased feed apparently will be cheaper than feed grown on Andros unless yields can be raised, growing costs reduced, or import prices increased dramatically.

If purchased feed is used, hog production could be located on any island with sufficient local demand. The costs of transporting live hogs between islands is high. This means that the most efficient system would be to locate most of the hog production with slaughtering facilities on New Providence or Grand Bahama Islands where the greatest market potential exists. Production on the other islands should not be encouraged beyond the demands of the local population.

Alternatively, a slaughtering facility could be built on Andros and processed meat shipped to Nassau and to the other islands, if sufficient volume could be produced and refrigerated transportation was available. Hog production would be a good use of labor during slack periods of crop production on Andros. Concentration of production on either island would permit higher volume feed handling and perhaps lower costs.