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Pork Information Gateway

# Economics of gestation housing

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## Introduction

The economics of various methods for housing gestating sow has received very little attention by the pork industry. The most common method for housing gestating sows is indoors in individual stalls. The major reasons for using individual gestation stalls are: (1) a worker can more easily manage a larger number of sows with respect to feeding, vaccinating, mating, moving individual animals, etc., (2) physical aggression between sows is reduced, (3) a worker can more easily control the environmental aspects "needed" by the sow, (3) more sows can be housed in a smaller area, (4) overall hygiene of sows is improved due to better control of the dunging area, and (5) reproductive performance of the herd is enhanced per sow inventoried.

There is little doubt that gestation housing systems in the future will have to meet the welfare requirements of the sow and production standards desired by pork producers. The integration of welfare and production standards will be challenging.

## Objective

Describe a computer model that can be used to evaluate the impact of various group-housing systems for gestating sows.

## Background

It has been suggested that the requirements of the sow are "freedom" from malnutrition, thermal discomfort, physical discomfort, injury, diseases, fear, stress and suppression of normal behavior. The suggested requirements for the pig producer are high biological performance, low labor input, ease of management, reasonable operating costs, acceptable capital cost, and acceptable financial return. Welfare concerns can be addressed in a well-designed and managed group-housing system; however, all welfare concerns cannot be eliminated.

The major goal of an owner of a sow farm is to maximize sow productivity. Therefore, a housing system that has negative impacts on reproductive performance is to be avoided. Many factors influence the reproductive performance of sows (genetics, health, environment, geographic location, worker skill, management, etc.); thus, the housing system plays an important but not an exclusive part on the reproductive performance of sows. Although a number of studies have been published comparing sow performance in different housing systems, care must be taken when interpreting data generated from records gathered from several different farms. Most farms have only one system for housing sows; thus, a direct comparison between housing systems is confounded (not able to determine true effects) with farm effects.

One method to evaluate the possible economic effects of various biological and building construction aspects on a gestation housing system is to use a computer model. This paper briefly describes a computer model that can be used to evaluate the impact of various group-housing systems for gestating sows and management procedures on the cost of the gestation phase per pig weaned. The values used in the below figures are examples only to demonstrate how the template works. Pork producers will need to work with their contractors and consultants to obtain a realistic value for their situation.

## Remodeling to replace stalls with group-housing

A vast number of different scenarios can be generated for converting an existing breeding-gestation facility into a group-housing environment. The first part of the model allows the user to briefly describe the buildings being evaluated (Figure 1). Some remodeling projects will most likely require the construction of additional buildings to meet certain welfare concerns. This model allows the user to add buildings. Other remodeling projects might require additional buildings; however, additional buildings will not be constructed due to the possibility of a person not wanting to go through the environmental permitting process. The second part of the model allows the user to enter annual ownership costs and variable costs for the breeding-gestation facility. The annual ownership factors for this model include depreciation on building structure, depreciation on equipment, interest on building and equipment (opportunity costs), repairs on building and equipment, taxes on building, insurance on building, and insurance on equipment. The annual variable cost factors for this model include the following factors for the breeding-gestation phase only: labor, feed, utilities, fuel, oil, veterinary services, vaccines, health supplies, semen and AI supplies, depreciation on breeding herd, interest on breeding herd (opportunity cost), insurance on breeding herd, operating loan payment of principal, and operating loan payment of interest. The third part of the model allows the user to evaluate the effect of farrowing rate and litter size on the cost of the gestation-breeding phase per weaned pig.

| DRAFT VERSION | Description of Gestation Buildings | | |
|---|---|---|---|
| Item: | Existing Building | Building Remodeled | Additional New Building |
| Number of sows in building | 978 | 870 | 108 |
| Length of building id. ft | 308 | 308 | 50 |
| Width of building, id.ft | 60 | 60 | 42 |
| Type of floor | Partial Slats | Partial slats | Partial Slats |
| Feeding system | Individual Drops | Mechanical | Electric Sow Feeders |
| ventilation method | Mechanical | Trough | Mechanical |
| Watering method | Trough | Deep pit | Swing |
| Manure handling method | Deep pit | Groups of sows | Deep pit |
| Type of Penning | Individual Stalls | Steel | Groups of sows |
| Type of Partitions & gating | | | Steel |

| | Input values | | | | | | |
|---|---|---|---|---|---|---|---|
| | Existing System | | Remodeled system | | | | |
| Number of sows on inventory for enterprise | 1215 | | 1215 | | | | |
| Annual ownership costs for breeding-gestation | | | | | | | |
| Depreciation non-building structure | $24,948 | Calculate | $28,009 | Calculate | | | |
| Depreciation equipment | $19,560 | Calculate | $17,640 | Calculate | | | |
| Interest on buildings and equipment (opportunity cost) | $22,850 | Calculate | $17,700 | Calculate | | | |
| Repairs on building/equipment | $12,228 | Calculate | $9,457 | Calculate | | | |
| Taxes on building | $6,237 | Calculate | $7,093 | Calculate | | | |
| Insurance on buildings | $1,040 | Calculate | $822 | Calculate | | | |
| Insurance on equipment | $489 | Calculate | $360 | Calculate | | | |
| Subtotal | $87,352 | | $81,081 | | | | |
| | | | | | | | |
| Annual variable costs for breeding-gestation | | | | | | | |
| Breeding-gestation labor | $73, 950 | Calculate | $56,100 | Calculate | | | |
| Breeding-gestation feed cost | $111, 303 | Calculate | $111,303 | Calculate | | | |
| Utilities, fuel and oil for breeding-gestation | $17, 849 | Calculate | $17,849 | Calculate | | | |
| Veterinary, vaccines, supplies | $14, 670 | Calculate | $14,670 | Calculate | | | |
| Cost of AI (semen & supplies) | $46,809 | Calculate | $46,809 | Calculate | | | |
| Depreciation on breeding herd | $60,414 | Calculate | $60,414 | Calculate | | | |
| Interest on breeding herd (opportunity cost) | $13,046 | Calculate | $13,046 | Calculate | | | |
| Insurance on breeding herd | $2,413 | Calculate | $2,413 | Calculate | | | |
| Operating loaon payment (principal) | $138,801 | Calculate | $129,301 | Calculate | | | |
| Operating loan payment (interest) | $9,716 | Calculate | $9,051 | Calculate | | | |
| Subtotal | $488,971 | | $460,956 | | | | |
| | | | | | | | |
| Total annual ownership and variable cost | $576,323 | | $542,037 | | | | |
| | | | | | | | |
| Estimated farrowing rate | 85.00% | To change | 85.00% | To change | | | |
| Estimated Number of piglets weaned per litter | 10.00 | | 10.50 | | | | |
| Estimated building & operating cost per pig | $21.26 | | $19.04 | | | | |

| Breeding-gestation building and operating cost per weaned piglet | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Farrowing | Piglets weaned per litter | | | | | | | | |
| rate | 9.0 | 9.5 | 10.0 | 10.5 | 11.0 | 11.5 | 12.0 | | |
| 85.00% | $23.62 | $22.37 | $21.26 | $20.24 | $19.32 | $18.48 | $17.71 | Existing System | |
| 85.00% | $22.21 | $21.04 | $19.99 | $19.04 | $18.17 | $17.38 | $16.66 | Remodeled System | |
| Difference | $(1.40) | $(1.33) | $(1.26) | $(1.20) | $(1.15) | $(1.10) | $(1.05) | | |

Figure 1 indicates an example of a spreadsheet for entering the data into the annual ownership cells and annual variable cost cells. The user can enter "known" values directly into each cell or calculate a value to enter into each cell.

**Figure 1. Spread sheet for remodeling a breeding-gestation facility. Input values are only examples to demonstrate how the template works.**

| | Existing System | Remodeled System |
|---|---|---|
| INVESTMENT IN BUILDING STRUCTURE | | |
| Building structure, sq ft | 18,480 | 18,480 |
| Cost per sq foot | $22.50 | $22.50 |
| Useful life, years | 15 | 15 |
| Salvage value, % of total investment | 10% | 10% |
| Calculated cost of building structure | $415,800 | $415,800 |
| Calculated salvage value | $41,580 | $41,580 |
| Calculated depreciation (straight-line) | $24,948 | $24,948 |
| Current age of building, years | | 8.0 |
| Current depreciated value of initial building | | $216,216 |
| Remodeling cost of existing building structure | | $60,000 |
| Current value of remodeled building | | $276,216 |
| Useful life of remodeled building, years | | 10 |
| Salvage value, % of total investment | | 10.00% |
| Calculated salvage value, $ | | $27,622 |
| Calculated depreciation (straight line) | | $24,859 |
| New building structure, sq ft | | 2,100 |
| Cost per square foot of new building | | $25.00 |
| Useful life of new building, years | | 15 |
| Salvage value, % of total investment | | 10% |
| Calculated cost of new building structure | | $52,500 |
| Calculated salvage value | | $5,250 |
| Calculated depreciation (straight-line) | | $3,150 |
| Total depreciation for building structure | $24,948 | $28,009 |
| | Back | Back |
| INVESTMENT IN EQUIPMENT | | |
| Equipment (feeders, panels, stalls, etc) | $195,600 | $195,600 |
| Useful life, years | 10 | 10 |
| Salvage value, % of total investment | 0% | 0% |
| Calculated salvage value | - | - |
| Calculated depreciation (straight-line) | $19,560 | $19,560 |
| Current age of equipment, years | | 8.0 |
| Current depreciated value of initial equipment | | $39,120 |
| Remodeling cost for new equipment | | $90,000 |
| Current value of equipment | | $129,120 |
| Useful life of equipment, years | | 8.0 |
| Salvage value, % of total investment | | 0.0% |
| Calculated salvage value | | - |
| Calculated depreciation (straight-line) | | $16,140 |
| Cost of new building equipment | | $15,000 |
| Useful life of new building equipment, years | | 10 |
| Salvage value, % of total investment | | 0% |
| Calculated salvage value | | - |
| Calculated depreciation (straight-line) | | $1,500 |
| Total depreciation for equipment | $19,560 | $17,640 |
| | Back | Back |
| INTEREST ON BUILDINGS AND EQUIPMENT | | |
| Interest rate, % | 7.00% | 7.00% |
| Calculated interest (opportunity cost) | $22,854 | $17,700 |
| | Back | Back |

**Figure 2. Spread sheet to calculate various input values for remodeling. Input values are only examples only to demonstrate how the template works.**

Figure 2 indicates an example of the various types of values that can be calculated. This function allows the user to evaluate numerous "what if" scenarios. It is beyond the scope of this paper to discuss in detail all the various aspects of the model. The reader can easily observe in Figure 2 the types of input that can be entered by the user.

| | Existing System | Remodeled System |
|---|---|---|
| REPAIRS ON BUILDING AND EQUIPMENT | | |
| Percentage of total cost of building & equipment | 2.00% | 2.00% |
| Yearly cost | $12,228 | $9,457 |
| | Back | Back |
| TAXES ON BUILDING | | |
| Percentage of total building cost | 1.50% | 1.50% |
| Yearly cost | $6,237 | $7,093 |
| | Back | Back |
| INSURANCE ON BUILDING | | |
| % of total building cost without equipment | 0.25% | 0.25% |
| Yearly cost | $1,040 | $822 |
| | Back | Back |
| INSURANCE ON EQUIPMENT | | |
| % of total equipment cost | 0.25% | 0.25% |
| Yearly cost | $489 | $360 |
| | Back | Back |
| LABOR | | |
| Number of employees (level 1) | 1 | 1 |
| Average wages per employee, $/hour | $12.00 | $12.00 |
| Average number of hours per week per employee | 50 | 50 |
| Number of weeks per year | 51 | 51 |
| Number of employees (level 2) | 1 | 1 |
| Average wages per employee, $/hour | $10.00 | $10.00 |
| Average number of hours per week per employee | 50 | 50 |
| Number of weeks per year | 51 | 51 |
| Number of employees (level 3) | 1 | 1 |
| Average wages per employee, $/hour | 7 | $7.00 |
| Average number of hours per week per employee | 50 | 50 |
| Number of weeks per year | 51 | 51 |
| Total Labor | $76,950 | $56,100 |
| | Back | Back |
| Labor per sow | $75.61 | $64.48 |
| | | |
| FEED | | |
| NEW BUILDING | | |
| Pounds of feed per head per day | | 5 |
| Number of days per yeaer | | 365 |
| Utilization rate of gestating space, % per year | | 95.00% |
| REMODELED BUILDING | | |
| Pounds of feed per head per day | 5 | 5 |
| Number of days per yeaer | 365 | 365 |
| Utilization rate of gestating space, % per year | 95.00% | 95.00% |
| Total feed, ton | 848 | 848 |
| INGREDIENT | | |
| Grain, % in diet | 81.70% | 81.70% |
| Protein, % in diet | 14.50% | 14.50% |
| Base mix, % in diet | 3.80% | 3.80% |
| | 100% | 100.00% |
| Grain, $/bushel | $2.37 | $2.37 |
| Protein, $/ton | $256.80 | $256.80 |
| Cost per ton of diet | $381.45 | $381.45 |
| Grain | $69.15 | $69.15 |
| Protein | $37.24 | $37.24 |
| Base mix | $14.50 | $14.50 |
| Total dollars | $120.88 | $120.88 |
| Processing, $/ton | $10.40 | $10.40 |
| Total cost per ton of diet | $131.28 | $131.28 |
| Total yearly cost | $111.303 | $111,303 |
| | Back | Back |

**Figure 2. Continued. Input values are only examples only to demonstrate how template works.**

| | | |
|---|---|---|
| UTILITIES, FUEL AND OIL | | |
| Cost per sow space per day (new building) | | $0.05 |
| Cost per sow space per day (existing or remodel) | $0.05 | $0.05 |
| Total yearly cost | $17,849 | $17,849 |
| | Back | Back |
| VETERINARY, VACCINES, SUPPLIES | | |
| Cost per sow per year (new building) | | $15.00 |
| Cost per sow per year (existing or remodel) | $15.00 | $15.00 |
| Total yearly cost | $14,670 | $14,670 |
| | Back | Back |
| SEMEN COST | | |
| Farrowing interval, days | 7 | 7 |
| Number of farrowing crates per group | 52 | 52 |
| Estimated average yearly farrowing rate % | 85.00% | 85.00% |
| Cost of each A.I. Catheter | $0.17 | $0.17 |
| Cost of semen per dose | $6.50 | $6.50 |
| Average number of inseminations/female/estrus | 2.2 | 2.2 |
| Cost of catheters per year | $1.193 | $1.193 |
| Cost of semen per year | $45,616 | $45,616 |
| Total cost of semen and supplies | $46,809 | $46,809 |
| | Back | Back |
| Number of sows inseminated per year on farm | 3,190 | 3,190 |
| Cost per sow inseminated | 14.67 | 14.67 |
| | | |
| Depreciation on breeding herd | | |
| Sow inventory, head | 1215 | 1215 |
| Boar inventory, head | 5 | 5 |
| Purchase price of gilt, $/head | $198 | $198 |
| Purchase price of boar, $/head | $150 | $150 |
| Sow replacement rate, % | 55.00% | 55.00% |
| Boars culled, % | 40.00% | 40.00% |
| Sow death loss, % | 8.00% | 8.00% |
| Cull price of sows, $/cwt | $29.65 | $29.65 |
| Cull price of boars, $/cwt | $26.69 | $26.69 |
| Cull weight of sows, 1b/hd | 425 | 425 |
| Cull weight of boars, 1b/hd | 450 | 450 |
| Value of cull sows adjusted for death loss, $/hd | $107.68 | $107.68 |
| Value of cull boars, $/hd | $120.11 | $120.11 |
| Depreciated value of sows | $60,354 | $60,354 |
| Depreciated value of boars | $60 | $60 |
| Total depreciation | $60,414 | $60,414 |
| | Back | Back |

**Figure 2. Continued. Input values are examples only to demonstrate how template works.**

## New group-housing gestation facility

The model to evaluate the influence of a new breeding-gestation facility on the cost of the breeding-gestation phase per weaned pig is essentially the same as the previously described model. This model allows the user to evaluate two options simultaneously (Figure 3). The various types of aspects that can be calculated for each scenario are indicated in Figure 4.

| | | |
|---|---|---|
| INTEREST ON BREEDING HERD (OPPORTUNITY COST) | | |
| Purchase price of gilt, $/hd | $198 | $198 |
| Value of cull sows adjusted for death loss, $/hd | $107.68 | $107.68 |
| Sow inventory, hd | 1215 | 1215 |
| Purchase price of boar, $/hd | 150 | 150 |
| Value of cull boars, $/hd | $120 | $120 |
| Boar inventory, hd | 5 | 5 |
| Interest rate, % | 7.00% | 7.00% |
| Calculated interest on breeding herd, $ | $13,046 | $13,046 |
| | Back | Back |
| INSURANCE ON BREEDING HERD | | |
| Sow inventory, hd | 1215 | 1215 |
| Boar inventory, hd | 5 | 5 |
| Purchase price of gilt, $/hd | $198 | $198 |
| Purchase price of boar, $/hd | $150 | $150 |
| Percentage of total invetmenet | 1.00% | 1.00% |
| Total investment | $241,320 | $241,320 |
| Yearly insurance | $2,413 | $2,413 |
| | Back | Back |
| INTEREST ON OPERATING COST | | |
| Proportion of operating cost financed, % | 50.00% | 50.00% |
| Duration of loan, months | 12 | 12 |
| Interest rate on operating loan, % | 7.00% | 7.00% |
| Total operating cost, $ | $279,222 | $268,601 |
| Amount of operating loan | $139,611 | $129,301 |
| | Back | Back |
| Yearly Interest | $9,773 | $9,051 |
| | Back | Back |

**Figure 2. Continued. Input values are examples only to demonstrate how template works.**

## New hoop-structure gestation facility.

The model to evaluate the influence of hoop breeding-gestation facilities on the cost of the breeding-gestation phase per weaned pig is essentially the same as the model described for the remodeling project. This model allows the user to evaluate two options simultaneously (Figure 5 and 6). Some of the options that might be evaluated are whether the sows should be fed inside the hoop in feeding stalls or fed individually outside the hoop in a shared feeding area. The number of sows per hoop is definitely decreased when the sows are fed individually inside the hoop. However, additional labor is required for feeding when sows have to be moved to a specific feeding area. These computer models are available by contacting the National Pork Board.

| DRAFT VERSION | Description of Gestation Buildings | |
|---|---|---|
| Item: | Option 1 | Option 2 |
| Number of sows in building | 978 | 978 |
| Length of building id. ft | 308 | 310 |
| Width of building, id.ft | 60 | 60 |
| Area for alleys etc square feet | 924 | 924 |
| Calculated space per animal, sq ft | 17.95 | 18.07 |
| Type of floor | Total slats | Partial slats |
| Feeding system | Electronic sow feeders | Biofixation |
| Ventilation method | Mechanical | Mechanical |
| Watering method | Trough | Trough |
| Manure handling method | Deep pit | Deep pit |
| Type of Penning | Groups of sows | Groups of sows |
| Type of Partitions & gating | Steel | Steel |

| | Option 1 | | Option 2 | |
|---|---|---|---|---|
| Number of sows on inventory for enterprise | 1215 | | 1215 | |
| Annual ownership costs for breeding-gestation | | | | |
| Depreciation non-building structure | $24,948 | Calculate | $22,320 | Calculate |
| Depreciation equipment | $15,000 | Calculate | $13,500 | Calculate |
| Interest on buildings and equipment (opportunity cost) | $21,258 | Calculate | $19,047 | Calculate |
| Repairs on building/equipment | $11,316 | Calculate | $11,070 | Calculate |
| Taxes on building | $6,237 | Calculate | $5,580 | Calculate |
| Insurance on buildings | $1,040 | Calculate | $1,046 | Calculate |
| Insurance on equipment | $375 | Calculate | $338 | Calculate |
| Subtotal | $80,174 | | $72,901 | |
| Annual variable costs for breeding-gestation | | | | |
| Breeding-gestation labor | $73,950 | Calculate | $73,950 | Calculate |
| Breeding-gestation feed cost | $111,303 | Calculate | $111,303 | Calculate |
| Utilities, fuel and oil for breeding-gestation | $17,849 | Calculate | $14,279 | Calculate |
| Veterinary, vaccines, supplies | $14,670 | Calculate | $14,670 | Calculate |
| Cost of AI (semen & supplies) | $46,809 | Calculate | $46,809 | Calculate |
| Depreciation on breeding herd | $60,414 | Calculate | $60,414 | Calculate |
| Interest on breeding herd (opportunity cost) | $13,046 | Calculate | $13,046 | Calculate |
| Insurance on breeding herd | $2,413 | Calculate | $2,413 | Calculate |
| Operating loan payment (principal) | $1339,155 | Calculate | $137,247 | Calculate |
| Operating loan payment (interest) | $9,741 | Calculate | $9,607 | Calculate |
| Subtotal | $489,350 | | $486,738 | |
| Total annual ownership and variable cost | $569,524 | | $556,639 | |
| Estimated farrowing rate | 85.00% | To change | 85.00% | To change |
| Estimated Number of piglets weaned per litter | 10.00 | | 10.00 | |
| Estimated building & operating cost per pig | $21.00 | | $20.53 | |

Breeding-gestation building and operating cost per weaned piglet

| Farrowing rate | Piglets weaned per litter | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 9.0 | 9.5 | 10.0 | 10.5 | 11.0 | 11.5 | 12.0 | |
| 85.00% | $23.34 | $22.11 | $21.00 | $20.00 | $19.10 | $18.26 | $17.50 | Option 1 |
| 85.00% | $22.81 | $21.61 | $20.53 | $19.55 | $18.66 | $17.85 | $17.11 | Option 2 |
| Difference | $(0.53) | $(0.50) | $(0.48) | $(0.45) | $(0.43) | $(0.41) | $(0.40) | |

**Figure 3. Example of calculations for two options when using new breeding-gestation facilities. Input values are examples only to demonstrate how template works.**

| INVESTMENT IN BUILDING STRUCTURE | Option 1 | Option 2 |
|---|---|---|
| Building structure, square ft | 18,480 | 18,600 |
| Cost per square ft | $22.50 | $20.00 |
| Useful life, years | 15 | 15 |
| Salvage value, % of total investment | 10% | 10% |
| Calculated cost of building structure | $415,800 | $372,000 |
| Calculated salvage value | $41,580 | $37,200 |
| Calculated depreciation (straight-line) | $24,948 | $22,320 |
| INVESTMENT IN EQUIPMENT | Back | Back |
| Equipment (feeders, panels, waterers, etc) | $150,000 | $135,000 |
| Useful life, years | 10 | 10 |
| Salvage value, % of total investment | 0% | 0% |
| Calculated salvage value | - | - |
| Calculated depreciation (straight-line) | $15,000 | $13,500 |
| INTEREST ON BUILDINGS AND EQUIPMENT | Back | Back |
| Interest rate | 7.00% | 7.00% |
| Calculated interest (opportunity cost) | $21,258 | $19,047 |
| REPAIRS ON BUILDING AND EQUIPMENT | Back | Back |
| Percentage of total cost of building & equipment | 2.00% | 2.00% |
| Yearly cost | $11,316 | $10,140 |
| TAXES ON BUILDING | Back | Back |
| Percentage of total building cost | 1.50% | 1.50% |
| Yearly cost | $6,237 | $5,580 |
| INSURANCE ON BUILDING | Back | Back |
| Percentage of total building cost without equipment | 0.25% | 0.25% |
| Yearly cost | $1,040 | $930 |
| INSURANCE ON EQUIPMENT | Back | Back |
| Percentage of total equipment cost | 0.25% | 0.25% |
| Yearly cost | $375 | $338 |
| LABOR | Back | Back |
| Number of employees (level 1) | 1 | 1 |
| Average wages per employee, $/hour | $12.00 | $12.00 |
| Average number of hours per week per employee | 50 | 50 |
| Number of weeks per year | 51 | 51 |
| Number of employees (level 2) | 1 | 1 |
| Average wages per employee, $/hour | $10.00 | $10.00 |
| Average number of hours per week per employee | 50 | 50 |
| Number of weeks per year | 51 | 51 |
| Number of employees (level 3) | 1 | 1 |
| Average wages per employee, $/hour | $7.00 | $7.00 |
| Average number of hours per week per employee | 50 | 50 |
| Number of weeks per year | 51 | 51 |
| Total Labor | $73,950 | $73,950 |
| Labor per sow | Back $75.61 | Back $75.61 |

**Figure 4. Spread sheet to calculate various input values for two options of a new gestation facility. Input values are examples only to demonstrate how template works.**

| FEED | Option 1 | Option 2 |
|---|---|---|
| Pounds of feed per head per day | 5 | 5 |
| Number of days per year | 365 | 365 |
| Utilization rate of gestating space, % per year | 95.00% | 95.00% |
| Total feed, ton | 848 | 848 |
| Ingredient | | |
| Grain, % in diet | 81.70% | 81.70% |
| Protein, % in diet | 14.50% | 14.50% |
| Base Mix, % in diet | 3.80% | 3.80% |
| | 100.00% | 100.00% |
| Grain, $/bushel | $2.37 | $2.37 |
| Protein, $/ton | $256.80 | $256.80 |
| Base mix, $/ton | $381.45 | $381.45 |
| Cost per ton of diet | | |
| Grain | $69.15 | $69.15 |
| Protein | $37.24 | $37.24 |
| Base mix | $14.50 | $14.50 |
| Total dollars | $120.88 | $120.88 |
| Processing, $/ton | $10.40 | $10.40 |
| Total cost per ton of diet | $131.28 | $131.28 |
| Total yearly cost, $ | $111,303 | $111,303 |
| UTILITIES, FUEL AND OIL | Back | Back |
| Cost per sow space per day | $0.05 | $0.04 |
| Total yearly cost | $17,849 | $14,279 |
| VETERINARY, VACCINES, SUPPLIES | Back | Back |
| Cost per sow per year | $15.00 | $15.00 |
| Total yearly cost | $14,670 | $14,670 |
| SEMEN COST | Back | Back |
| Farrowing interval, days | 7 | 7 |
| Number of farrowing crates per group | 52 | 52 |
| Estimated average yearly farrowing rate | 85.00% | 85.00% |
| Cost of each A.I. Catheter | $0.17 | $0.17 |
| Cost of semen per dose | $6.50 | $6.50 |
| Average number of inseminations/female/estrus | 2.2 | 2.2 |
| Cost of catheters per year | $1,193 | $1,193 |
| Cost of semen per year | $45,616 | $45,616 |
| Total cost of semen and supplies | $46,809 | $46,809 |
| Number of sows inseminated per year on farm | Back 3190 | Back 3190 |
| Cost per sow inseminated | 14.67 | 14.67 |

**Figure 4. Continued. Input values are examples only to demonstrate how template works.**

| DEPRECIATION ON BREEDING HERD | Option 1 | Option 2 |
|---|---|---|
| Sow inventory, hd | 1215 | 1215 |
| Boar inventory, hd | 5 | 5 |
| Purchase price of gilt, $/hd | $198 | $198 |
| Purchase price of boar, $/hd | $150 | $150 |
| Sow replacement rate | 55.00% | 55.00% |
| Boars culled | 40.00% | 40.00% |
| Sow death loss | 8.00% | 8.00% |
| Cull price of sows, $/cwt | $29.65 | $29.65 |
| Cull price of boars, $/cwt | $26.69 | $26.69 |
| Cull weight of sows, lb/hd | 425 | 425 |
| Cull weight of boars, lb/hd | 450 | 450 |
| Value of cull sows adjusted for death loss, $/hd | $107.68 | $107.68 |
| Value of cull boars, $/hd | $120.11 | $120.11 |
| Depreciated value of sows | $60,354 | $60,354 |
| Depreciated value of boars | $60 | $60 |
| Total depreciation | $60,414 | $60,414 |
| INTEREST ON BREEDING HERD (OPPORTUNITY COST) | Back | Back |
| Purchase price of gilt, $/hd | $198 | $198 |
| Value of cull sows adjusted for death loss, $/hd | $108 | $108 |
| Sow inventory, hd | 1215 | 1215 |
| Purchase price of boar, $/hd | $150 | $150 |
| Value of cull boars, $/hd | $120 | $120 |
| Boar inventory, hd | 5 | 5 |
| Interest rate (opportunity rate) | 7.00% | 7.00% |
| Interest on breeding herd | $13,046 | $13,046 |
| INSURANCE ON BREEDING HERD | Back | Back |
| Sow inventory, hd | 1215 | 1215 |
| Boar inventory, hd | 5 | 5 |
| Purchase price of gilt, $/hd | $198 | $198 |
| Purchase price of boar, $/hd | $150 | $150 |
| Percentage of total investment | 1.00% | 1.00% |
| Total investment | $241,320 | $241,320 |
| Yearly insurance | $2,413 | $2,413 |
| INTEREST ON OPERATING COST | Back | Back |
| Proportion of operating cost financed | 50.00% | 50.00% |
| Duration of loan, months | 12 | 12 |
| Interest rate on operating loan | 7.00% | 7.00% |
| Total operating cost | $278,310 | $274,494 |
| Amount of operating loan | $139,155 | $137,247 |
| Yearly interest | Back $9,741 | Back $9,607 |
| | Back | Back |

**Figure 4. Continued. Input values are examples only to demonstrate how template works.**

| DRAFT VERSION | Brief description of hoop structure | |
|---|---|---|
| Item: | Option 1 | Option 2 |
| Length of hoop, i.d. ft | 100 | 100 |
| Width of hoop, i.d. ft | 30 | 30 |
| Number of sows in hoop | 65 | 130 |
| Type of floor | Dirt with bedding | Dirt with bedding |
| Feeding system | Feeding stalls inside | Shared feeding stalls inside |
| Ventilation method | Natural | Natural |
| Watering method | Bowl | Bowl |
| Manure handling method | Solid manure | Solid manure |
| Type of penning | Groups of sows | Groups of sows |
| Type of partitions and gating | Steel horizontal bars | Steel horizontal bars |

| | Option 1 | | Option 2 | |
|---|---|---|---|---|
| ANNUAL OWNERSHIP COSTS FOR HOOP | | | | |
| Depreciation on hoop structure | $9,083 | Calculate | $6,713 | Calculate |
| Depreciation on equipment | $18,514 | Calculate | $11,451 | Calculate |
| Interest on hoop structure and equipment | $10,364 | Calculate | $7,113 | Calculate |
| Repairs on hoop structure and equipment | $5,620 | Calculate | $3,841 | Calculate |
| Taxes on hoop | $2,271 | Calculate | $1,678 | Calculate |
| Insurance on hoop | $378 | Calculate | $280 | Calculate |
| Insurance on equipment | $324 | Calculate | $200 | Calculate |
| Subtotal | $46,554 | | $31,276 | |
| Annual variable costs for hoop | | | | |
| Breeding-gestation labor | $86,700 | Calculate | $104,550 | Calculate |
| Breeding-gestation feed cost | $111,303 | Calculate | $111,303 | Calculate |
| Bedding cost | $24,206 | Calculate | $24,202 | Calculate |
| Removal & disposal of manure pack | $3,000 | | $1,600 | |
| Utilities, fuel & oil for breeding-gestation | $10,709 | Calculate | $10,709 | Calculate |
| Veterinary, vaccines, supplies | $14,670 | Calculate | $14,670 | Calculate |
| Cost of AI (semen & supplies) | $46,809 | Calculate | $46,809 | Calculate |
| Depreciation on breeding herd | $60,414 | Calculate | $60,414 | Calculate |
| Interest on breeding herd | $13,046 | Calculate | $13,046 | Calculate |
| Insurance on breeding herd | $2,413 | Calculate | $2,413 | Calculate |
| Operating loan payment (principal) | $152,715 | Calculate | $160,049 | Calculate |
| Operating loan payment (interest) | $10,690 | Calculate | $11,203 | Calculate |
| Subtotal | $536,675 | | $560,968 | |
| Total annual ownership and variable cost | $583,229 | | $592,244 | |
| Estimated farrowing rate | 85.0% | | 85.0% | |
| Estimated number of piglets weaned per litter | 10.50 | To change | 10.50 | To change |
| Estimated building & operating cost per pig | $20.49 | | $20.80 | |

| Farrowing | Piglets weaned per litter | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| rate | 9.0 | 9.5 | 10.0 | 10.5 | 11.0 | 11.5 | 12.0 | |
| 85.00% | $23.90 | $22.64 | $21.51 | $20.49 | $19.55 | $18.70 | $17.93 | Option 1 |
| 85.00% | $24.27 | $22.99 | $21.84 | $20.80 | $19.86 | $18.99 | $18.20 | Option 2 |
| Difference | $(0.37) | $(0.35) | $(0.33) | $(0.32) | $(0.30) | $(0.29) | $(0.28) | |

**Figure 5. Computer template to evaluate the influence of hoop structures on cost of breeding-gestation phase per pig weaned. Input values are examples only to demonstrate how the template works.**

| | Option 1 | Option 2 |
|---|---|---|
| Total inventory of gestation sows & gilts | 978 | 978 |
| Number of sows per hoop | 65 | 130 |
| Bedded area inside of hoop, square feet | 1,862 | 3,000 |
| Bedded area per sow | 28.6 | 23.1 |
| Total numb er of hoops needed | 15 | 8 |
| INVESTMENT IN STRUCTURE OF HOOP | | |
| Side walls, end walls, tarp, flooring, etc. | $9,342 | $9,342 |
| Feeding system structure and floor | $750 | $4,644 |
| Total cost of structure for "each" hoop system | $10,092 | $13,986 |
| Total investment in hoop structures | $151,380 | $111,888 |
| Useful life, years | 15 | 15 |
| Salvage value, % of total investment | 10% | 10% |
| Calculated salvage value | $15,138 | $11,189 |
| Calculated depreciation (straight-line) | $9,083 | $6,713 |
| Cost per sow | Back $155 | Back $108 |
| INVESTMENT IN EQUIPMENT FOR HOOP | | |
| Feeding stalls | $4,640 | $5,120 |
| Feed delivery system | $2,500 | $2,600 |
| Cooling system | $500 | $500 |
| Gating and penning | $200 | $200 |
| Watering system | $800 | $1,600 |
| Total cost of equipment for "each" hoop system | $8,640 | $10,020 |
| Total cost of equipment for all hoops | $129,600 | $80,160 |
| Useful life, years | 7 | 7 |
| Salvage value, % of total investment | 0% | 0% |
| Calculated salvage value | - | - |
| Calculated depreciation (straight-line) | $18,514 | $11,451 |
| Cost per sow | Back $133 | Back $77 |
| Structure & equipment cost per sow | $288 | $185 |
| INTEREST ON STRUCTURE AND EQUIPMENT | | |
| Interest rate, % | 7.00% | 7.00% |
| Calculated interest (opportunity cost) | $10,364 | $7,113 |
| | Back | Back |

**Figure 6. Spreadsheet to calculate various input values for two options of a hoop facillity. Input values are examples only to demonstrate how template works.**

| REPAIRS ON STRUCTURE AND EQUIPMENT | Option 1 | Option 2 |
|---|---|---|
| Percentage of total cost of building & equipment | 2.00% | 2.00% |
| Yearly cost | $5,620 | $3,841 |
| TAXES ON HOOP STRUCTURE | Back | Back |
| Percentage of total building cost | 1.50% | 1.50% |
| Yearly cost | $2,271 | $1,678 |
| INSURANCE ON HOOP STRUCTURE | Back | Back |
| Percentage of total building cost | 0.25% | 0.25% |
| Yearly cost | $378 | $280 |
| INSURANCE ON EQUIPMENT | Back | Back |
| Percentage of total equipment cost | 0.25% | 0.25% |
| Yearly cost | $324 | $200 |
| LABOR | Back | Back |
| Number of employees (level 1) | 2 | 2 |
| Average wages per employee, $/hr | $12.00 | $12.00 |
| Average number of hours per week per employee | 50 | 50 |
| Number of weeks per year | 51 | 51 |
| Number of employees (level 2) | 1 | 1 |
| Average wages per employee, $/hr | $10.00 | $10.00 |
| Average number of hours per week per employee | 50 | 50 |
| Number of weeks per year | 51 | 51 |
| Number of employees (level 3) | 0 | 1 |
| Average wages per employee, $/hr | $7.00 | $7.00 |
| Average number of hours per week per employee | 50 | 50 |
| Number of weeks per year | 51 | 51 |
| Total labor | $86,700 | $104,550 |
| Labor per sow | $1,334 | $804 |
| | Back | Back |

**Figure 6. Continued. Input values are examples only to demonstrate how template works.**

| FEED | Option 1 | Option 2 |
|---|---|---|
| Poinds of feed per head per day | 5 | 5 |
| Number of days per year | 365 | 365 |
| Utilization rate of gestating space | 95.00% | 95.00% |
| Total feed, ton | 848 | 848 |
| | | |
| Ingredient | | |
| Grain, % in diet | 81.70% | 81.70% |
| Protein, % in diet | 14.50% | 14.50% |
| Base mix, % in diet | 3.80% | 3.80% |
| | 100.00% | 100.00% |
| Grain, $/bushel | $2.37 | $2.37 |
| Protein, $/ton | $256.80 | $256.80 |
| Base mix, $/ton | $381.45 | $381.45 |
| Cost per ton of diet | | |
| Grain | $69.15 | $69.15 |
| Protein | $37.24 | $37.24 |
| Base mix | $14.50 | $14.50 |
| Total dollars | $120.88 | $120.88 |
| Processing, $/ton | $10.40 | $10.40 |
| Total cost per ton of diet | $131.28 | $131.28 |
| Total yearly feed cost | $111,303 | $111,303 |
| | Back | Back |
| BEDDING | | |
| Bedding per sow per year, lbs | 1980 | 1980 |
| Bedding cost per lb | $0.0125 | $0.0125 |
| Total bedding cost | $24,206 | $24,206 |
| | Back | Back |
| UTILITIES, FUEL AND OIL | | |
| Cost per sow space per day | $0.03 | $0.03 |
| Total yearly cost | $10,709 | $10,709 |
| | Back | Back |
| VETERINARY, VACCINES, SUPPLIES | | |
| Cost per sow per year | $15.00 | $15.00 |
| Total yearly cost | $14,670 | $14,670 |
| | Back | Back |
| SEMEN COST OF SOWS HOUSED IN HOOP | | |
| Farrowing interval, days | 7 | 7 |
| Number of farrowing crates per group | 52 | 52 |
| Estimated average yearly farrowing rate | 85.00% | 85.00% |
| Cost of each A.I. catheter | $0.17 | $0.17 |
| Cost of semen per dose | $6.50 | $6.50 |
| Average number of inseminations/female/estrus | 2.2 | 2.2 |
| Cost of catheters per year | $1,193 | $1,193 |
| Cost of semen per year | $45,616 | $45,616 |
| Total cost of semen and supplies | $46,809 | $46,809 |
| | Back | Back |
| Number of sows inseminated per year on farm | 3,190 | 3,190 |
| Cost per sow inseminated | $14.67 | $14.67 |

**Figure 6. Continued. Input values are examples only to demonstrate how template works.**

| DEPRECIATION ON SOWS HOUSED IN HOOP | Option 1 | Option 2 |
|---|---|---|
| Sow inventory, hd | 1215 | 1215 |
| Boar inventory, hd | 5 | 5 |
| Purchase price of gilt, $/hd | $198 | $198 |
| Purchase price of boar, $/hd | $150 | $150 |
| Sow replacement rate | 55.00% | 55.00% |
| Boars culled | 40.00% | 40.00% |
| Sow death loss | 8.00% | 8.00% |
| Cull price of sows, $/cwt | $29.65 | $29.65 |
| Cull price of boars, $/cwt | $26.69 | $26.69 |
| Cull weight of sows, lb/hd | 425 | 425 |
| Cull weight of boars, lb/hd | 450 | 450 |
| Value of cull sows adjusted for death loss, $/hd | $108 | $108 |
| Value of cull boars, $/hd | $120 | $120 |
| Depreciated value of sow inventory | $60,354 | $60,354 |
| Depreciated value of boar inventory | $60 | $60 |
| Total depreciation | $60,414 | $60,414 |
| | Back | Back |
| INTEREST ON BREEDING HERD (OPPORTUNITY COST) | | |
| Purchase price of gilt, $/hd | $198 | $198 |
| Value of cull sows adjustted for death loss, $/hd | $108 | $108 |
| Sow inventory, hd | 1215 | 1215 |
| Purchase price of boar, $/hd | $150 | $150 |
| Value of cull boars, $/hd | $120 | $120 |
| Boar inventory, hd | 5 | 5 |
| Interest rate (opportunity rate) | 7.00% | 7.00% |
| Interest on breeding herd | $13,046 | $13,046 |
| | Back | Back |
| INSURANCE ON BREEDING HERD | | |
| Sow inventory, hd | 1215 | 1215 |
| Boar inventory, hd | 5 | 5 |
| Purchase price of gilt, $/hd | $198 | $198 |
| Purchase price of boar, $/hd | $150 | $150 |
| Percentage of total investment | 1.00% | 1.00% |
| Total investment | $241,320 | $241,320 |
| Yearly insurance | $2,413 | $2,413 |
| | Back | Back |
| INTEREST ON OPERATING COST | | |
| Proportion of operating cost financed | 50.00% | 50.00% |
| Duration of loan, months | 12 | 12 |
| Interest rate on operating loan | 7.00% | 7.00% |
| Total operating cost | $305,430 | $320,097 |
| Amount of operating loan | $152,715 | $160,049 |
| | Back | Back |
| Yearly interest | $10,690 | $11,203 |
| | Back | Back |

**Figure 6. Continued. Input values are examples only to demonstrate how template works.**

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Information developed for the Pork Information Gateway, a project of the U.S. Pork Center of Excellence supported fully by USDA/Agricultural Research Service, USDA/Cooperative State Research, Education, and Extension Service, Pork Checkoff, NPPC, state pork associations from Iowa, Kentucky, Missouri, Mississippi, Tennessee, Pennsylvania, and Utah, and the Extension Services from several cooperating Land-Grant Institutions including Iowa State University, North Carolina State University, University of Minnesota, University of Illinois, University of Missouri, University of Nebraska, Purdue University, The Ohio State University, South Dakota State University, Kansas State University, Michigan State University, University of Wisconsin, Texas A & M University, Virginia Tech University, University of Tennessee, North Dakota State University, University of Georgia, University of Arkansas, and Colorado State University.