

**Key Management Factors for
Successful Swine Production
in Hoop Structures**

December, 2005

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MANAGING HOOP STRUCTURES FOR MAXIMUM PROFITABILITY

Manitoba farmers now have more than nineteen years of experience with group housing pigs in straw bedded shelters. The results are good and more farms are constructing them in an effort to diversify farm income. Straw-bedded systems represent a low cost alternative to conventional housing. These systems are not restricted to hoop buildings however the principles which apply to management of pigs on straw will still largely apply in other structures as well. Converted machine sheds, horse barns, and poultry facilities are successfully being modified to rear pigs in groups of 500, 1000, or even 2000 pigs. Ventilation issues and access to feed, water and sleeping areas need to be approached differently in each type of facility.

Daily management and attention to the needs of the pig will be key to success in straw based systems. Interestingly, this is both the attraction for some people, and a deterrent for others who consider this approach to pig rearing.

This paper should be used in conjunction with the Manitoba Agriculture Food and Rural Initiatives Cost of Production (C.O.P.) Budget for swine raised in hoop structures. The COP budgets can be accessed from the MAFRI website <http://www.gov.mb.ca/agriculture/financial/farm/farm.html> . These are updated annually.

Hoop Barn Infrastructure

Our provincial budget model uses eighteen shelters 30 ft (9 m) x 100 ft (30 m) in size. Each shelter houses 250 pigs with approximately 1 square meter (12 square feet) per pig. It is expected that one shelter of 250 pigs will be marketed each week giving a sixteen week cycle. An additional shelter allows for reduced throughput due to unforeseen factors. Weather issues such as abnormal cold or heat can slow growth which increases the requirement for space. The eighteenth shelter is used as a holding shelter for market ready animals. Only water is available to animals in the holding shelter. Restricting feed prior to marketing increases the cut out value of the animal and reduces the chance of carcass contamination due to overfilled digestive tracts being accidentally cut during removal. This size of grow/finish operation requires the annual production of weanling from a six hundred sow farm. There may be variation from farm to farm but the important element is to size your operation to your supplier.

Double arch construction is used for the larger structures, which allows a wider span. For producers who have access to larger numbers of pigs, this may be an option even though the cost per pig place may rise.

Shelter entrances can be constructed in such a way that a skid-steer can move easily in and out loaded with straw or a scale/auto-sorter. The auto sorter is proving very valuable in reducing much of the manual labour related to pig sorting and scaling. Generally four auto-sorters are placed into four shelters. A group of pigs are moved into a shelter in week twelve where they remain for four weeks while they are gradually

shipped to market. If any pigs remain after week sixteen they are shipped light to a specialty market.

Site Selection and Development

Heavy equipment movement around these types of operations is necessary on a daily basis to move pigs, grain, straw and manure. This must occur in both winter and summer and requires some work to properly prepare the area for the barns. Placement in proximity to neighbours, towns and waterways, and the development of these areas is critical in order to prevent interruptions to daily operations. Essentially this means controlling water through drainage, containment of the liquid, and managing manure to minimize odour and impact on the local soil and waterways.

Generally the site should be high and if water doesn't naturally drain away from shelters, then the site should be raised an appropriate amount. A clay base should be applied, graded and packed. In areas where annual rainfall is heavy, geotextile fabric can be used for roadways and behind shelters to ensure access when necessary. Berms and liquid containment areas should be constructed around the manure storage sites to capture any runoff. As well, a mortalities composting area should be constructed on the manure composting pad.

Wind breaks can be helpful if strong winter winds are common in your area. In warmer climates cooling is also important so consider your most pressing need before you plant trees. Using the straw supply for a temporary wind break in the winter months has been satisfactory in Manitoba.

Equipment

Feeders should accommodate a wide range of feeds in either mash or pelleted form. Allow ten pigs per 30 cm of feeder space to prevent aggression. Access to feeder space should not require an effort from the pig. It should be able to stand naturally and eat. In cold climates pigs should be able to eat without contacting metal surfaces. Feeders that require pigs to turn their body or cause them to press against cold surfaces to eat will reduce feeding activity and slow growth.

Generally two four-hole *waterers* are used which are heated during winter. They are placed in various locations and should not interfere with the movement of the skid steer or equipment into the shelter.

Extra *bite drinkers*, attached to the wall, can be added in hot weather to allow additional opportunities for smaller or less aggressive pigs to drink.

Sprinklers are being added to assist cooling pigs during hot weather. This is a common method of cooling in hot climates. It is important not to add excessive amounts of water while cooling. This could lead to downward movement of nutrients into the soil

profile. Water droplets should be coarse since mists can cause the relative humidity to increase making the effects of heat worse for the pigs.

Sorting market weight pigs is increasingly being handled by *auto-sorters*. These devices are placed into dedicated weighing shelters in the access gate to the feeding area in week 12 of the 16 week cycle. Pigs are then moved into the weigh shelter to begin selection of market ready pigs. When the scale is activated, pigs are individually weighed and directed either into a holding area for market ready pigs or into the feeding area. Once lightweight pigs have eaten, they pass through one-way gates back into the strawed sleeping area. Holding areas can be established with portable gates or pigs can be held between shelters or sent into a runway along the front of shelters ending up in a holding barn. Data captured by these scales can be very helpful in evaluating management changes and evaluating feeding programs.

Introducing pigs into the shelter in winter can be assisted through the use of a *covered sleeping area*. The shelter is pre-charged with 15 or more bales. These bales can be positioned in such a way that a tarp can be placed over the bales. Alternatively, a frame can be made of steel square stock and a tarp attached to the frame. It should be large enough to allow all pigs enough room to sleep under the tarp. After a two-week period, larger pigs often sleep out in the straw away from the covered sleeping area. As the bales deteriorate, they can be spread in the sleeping area.

Elements of Profitability

Profitability is a measure of the amount of residual income over costs. There are many ways to measure this value. MAFRI budgets use return to assets. This lets us separate the return to the cost of the physical investments with the residual going to management and labour. In most cases the farmer is the owner/operator and so the residual is his profit.

Weather can dramatically affect feed intake and growth patterns. Hot weather can reduce feed intake or cold spells increase feed intake and reduce growth due to higher maintenance needs. Management plays a significant role in a straw based system because of the increased number of decisions required on a daily basis over those in a conventional structure.

Following are some important management areas and comments to assist producers in making effective decisions.

Management Considerations

1. Setting Performance Targets
2. Feed Management
3. Turn Over of the Structures
4. Straw Management
5. Genetics

6. Health Status
7. Marketing and Financing

In practice each of these factors is interrelated however profitability can be dramatically affected by decisions made in any one area, therefore an understanding of each factor is necessary.

Setting Performance Targets

Disease challenges may slow down growth. Space needs will be increased if slow downs persist. As a result, one or two extra shelters may be needed per site since shipments of weanlings will be arriving weekly and they need a place to be housed.

Beginning with a 22 kg weanling and feeding to 120 kg, pigs can be marketed on a 120 day cycle. There is usually a day allowed for clean out, disinfecting, strawing and restocking. This allows for three cycles per year using all-in-all-out production. Pigs will grow at approximately 820 grams/day. Carcasses will generally be 54-59% lean yield, cutting out at 80%. Loin depths will be 55-60 mm or more, with back fat at 18 mm \pm 2 mm. Timely adjustment to straw, feed, end tarps and stocking rates are necessary to maintain three complete cycles per year.

Feed Management

The feeding program follows that of any modern approach to ration formulation. Monitor pig weight gain and feed consumption to ensure that pigs newly introduced to the shelters are getting to the feeders and waterers. We need to formulate using ingredients which are attractive to pigs. Some ingredients are very appealing to pigs and others are not. We can use this fact to selectively affect intake and improve carcass quality.

Usually a three or four phase ration program will be used providing two grower rations and one, or two finisher rations depending on the final weight desired and on the lean tissue deposition rate of the pig. Nutrient levels are set using standardized ileal digestibilities.

TABLE 1	Three Phase Ration (kg) Program (High Lean Genetics)		
Ingredient	Pig Wt. 23-45 kg Grower 1	Pig Wt. 45-80 kg Grower 2	Pig Wt. 80-120 kg Finisher 1
Wheat	618.64	550	282.09
Barley	147	227	545
Soybean Meal 47%	193	181	147
Lysine	1.36	.91	.91
Vit./Min. Mix	30	30	25
Fat Source	10	10	-
TOTAL (kg)	1000	1000	1000

TABLE 2	Three Phase Ration Program (Nutrient Analysis)		
	Grower 1	Grower 2	Finisher 1
Crude Protein %	16.28	15.17	13.87
Lysine % (standardized ileal dig.)	.90	.81	.72
Calcium %	0.72	.72	.61
Total Phosphorous %	0.62	.62	.56
Digestible Energy (kcal/kg)	3332	3316	3170
Cost \$/tonne plus mixing	C\$163.70	C\$161.59	C\$149.32

Consumption patterns and costs of feeding as of November 2005 are broken down in the following manner.

Example:

<u>Ration</u>	<u>F.E</u>	<u>Feed Consumption</u>	<u>Cost</u>
Grower 1	2.5	55.0 kg	C\$9.00
Grower 2	2.7	94.5 kg	C\$15.27
Finisher 1	3.4	136.0 kg	C\$20.30
	2.86	285.5 kg	C\$44.57

Summary

Pig Cost	\$60.00
Feed Cost	\$44.57
All Other Costs	\$19.00
Cost of Production	C\$123.57

120 kg pig yields a 96 kg carcass at 80% cutout. Market price is assumed to be C\$160.00/100 kg.

Index

105 (96 kg)(1.05)(\$160) = C \$161.28

110 (96 kg)(1.10)(\$160) = C\$168.96

111 (96 kg)(1.14)(\$160) = C\$175.10

This leaves a return to management of approximately C\$45.00 per pig.

Turn Over of the Structures

Many of the costs are applied on a pig space basis. This is equivalent to the inventory of pigs on the farm. The more times you can turn over the pig space the lower the amount of long term assets we apply to the pig. Under no circumstances should the shelters be overstocked. This practice increases aggression and actually reduces growth rate and subsequently reduces the number of cycles we can get annually. As stress builds, the variance in the group grows. Variance is the spread between the first pig shipped and the last pig shipped.

When other management considerations are taken care of, the major determinant for profit will be the number of times the inventory of pigs can be turned over. This will maximize the total kilograms of pork produced by the farm. Commonly, three cycles per year are produced. Each cycle is allowed one hundred and twenty days including cleanout and re-strawing.

In the model presented in the budget 11,527 pigs are produced annually. The calculated margin of approximately C\$45 results in a return to management after costs of C\$518,715. Historically, a long-term average return of C\$15(UAH63.6) per pig is common. The actual return in any given year is quite variable and is a function of the supply/demand pig cycle and the cost of feed ingredients. It is advisable to begin an operation at the bottom of a market cycle to minimize chances of losses in the early stages of your business.

Since turnover is an important consideration for profitability, it is necessary to have a protocol for handling light hogs. They are an inevitable part of pig production and can tie up a shelter beyond the budgeted days. Rolling them over into other shelters or re-grouping only worsens the problem due to repeated growth lags and additional fighting. They can also be a considerable biosecurity hazard if they become a reservoir for disease organisms.

Straw Management

Part of understanding straw management is learning about pig behavior in a group environment. Pigs want distinct areas for eating, sleeping, manuring and drinking. Keep the sleeping area well strawed and dry. If this area becomes wet, then manuring will occur in the sleeping zone and the pigs will show stress. They will not know where to sleep or manure so the shelter will get very dirty often around the feeders and waterers.

The manuring areas are usually around the edges of the shelter and between the sleeping area and the feeding area. When adding straw, be generous in the sleeping area. Cover manure just enough to keep it from being excessively wet. Composting action will keep the manure pack at about 15°C even in the winter. By applying adequate straw, heat from composting is preserved to keep the pigs warm as they burrow under the straw. This heat from composting will work against you in warm seasons. Straw acts as an insulator so use enough in the sleeping area to keep the pigs comfortable. In warm weather the animals want to be cool so they will excavate areas to wallow in if you don't use sprinklers for cooling.

Control of air movement is an important part of providing a good environment and is closely tied to straw management. Proper adjustments of end tarps and side ventilation flaps will control drafts. Pigs can tolerate cold conditions provided we do not allow drafts through the shelter. Generally, temperatures of +1°C to +3°C can be maintained at pig height with careful attention to draft control. Over-strawing is expensive and should be avoided. Hot, dry periods mean less straw and cold or humid periods mean more straw. The comfort of the pig should never be compromised. In practice, the annual use of straw amounts to 1 kg/pig/day.

Genetics

Every animal is genetically programmed to grow at a certain rate and produce a specific type of carcass. All genetics currently available in Manitoba have been successfully reared in straw-based systems. Some are more prone to vices than others and are easily stimulated into aberrant behavior. These sensitive genotypes must be monitored and handled carefully as they have less tolerance for shortfalls in management.

The feeding program will be affected by the choice in genotypes. Rations in the Feed Management section of this document are for a high lean gain type, which has a lower daily consumption than most other genetics. Your genetic suppliers can give you suggestions for nutrient levels to maximize growth rate and index.

Health Status

Activation of the pig's immune response system will have a dramatic effect on growth rate. In addition to diverting dietary energy to fighting disease, a sick pig will often reduce intake. Together these depress growth rate and turnover in shelters. Essentially the pig's body has two choices for dietary energy and protein, maintenance

requirements, or growth. A disease challenge will force a shift towards maintenance needs.

For an all-in-all-out production, one role as managers is to be sure of the health status of the pigs and to implement an appropriate health program. Pigs should come from single source suppliers or from a nursery barn where health status has been equalized and stabilized. Vaccinations for common diseases are a recommended practice in consultation with a veterinarian.

Marketing and Financing

Every effort should be made to reduce risk. Producers should study market movements, as they tend to be cyclical. Utilize hedging and forward selling programs when they make sense to do so. Contracts and premiums are available but may not always maximize profit for the farm. Take time to do cash flows and examine past yields to determine actual value of these tools.

When approaching a bank or credit union, have a complete package prepared. This package should include an explanation of the following:

- 1) the physical setup
- 2) pig supply details or contract
- 3) manure management, mortalities protocol, environmental impact statement
- 4) cash flow
- 5) marketing plan
- 6) herd health plan

Initial operating capital requirements are large and could be structured as an intermediate loan rather than a current account. Discussions on the structure of the farm capital debt setup and initial operating capital requirements should be conducted with the lender. The impact on profitability can be substantial.

Hoop barn structures have their own unique management considerations. Failures will happen when breakdowns in management occur or poor decisions are made. Manage for the median pigs rather than the best pigs and things will go well.