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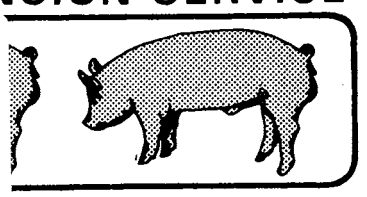

# Swine Update

VOLUME 4, NO. 4 APRIL, 1986

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## REMODELING DAIRY BARNS INTO HOG FINISHING UNITS

As a result of the dairy buy-out program, there have been numerous requests for remodeling tie and free stall dairy barns into hog confinement units. Some of the inquiries are for traditional conversion of tie stall dairy barns into farrowing facilities. A Pork Industry Handbook publication (Extension folder 588) entitled "Remodeling Ideas for Farrowing Facilities" has been written to answer these questions and is available through the Minnesota Extension Service's bulletin room. Other requests have been to convert dairy facilities to hog growing/finishing barns and, to a lesser extent, sow gestation units. This is probably due to the desire to finish hogs that are already farrowed on the farmstead, or possibly buy feeder pigs and finish them. Some of these dairy barns, especially the free stall units, lend themselves more toward conversion into hog finishing facilities rather than into farrowing units.

There are two general types of dairy barn conversions into hog finishing systems. One is the remodeling of a conventional tie stall barn (one or two story) into a "warm", mechanically ventilated barn for finishing hogs. The other common conversion is a free stall naturally ventilated barn into a modified open front hog finishing unit. Each of these will be discussed separately.

Figure 1 shows a typical cross section of a two story dairy barn conversion with two rows of long narrow pens and an alley down the center to conserve space. Handling the waste is of major concern, with liquid manure suggested since there is limited space to scrape, even with a skid steer loader. The waste handling scheme could either be a gravity drain or scraper system with gutters between 4 and 8 feet wide. Storage units may consist of either a buried concrete pit outside the barn, or an earthen lagoon or holding pond.

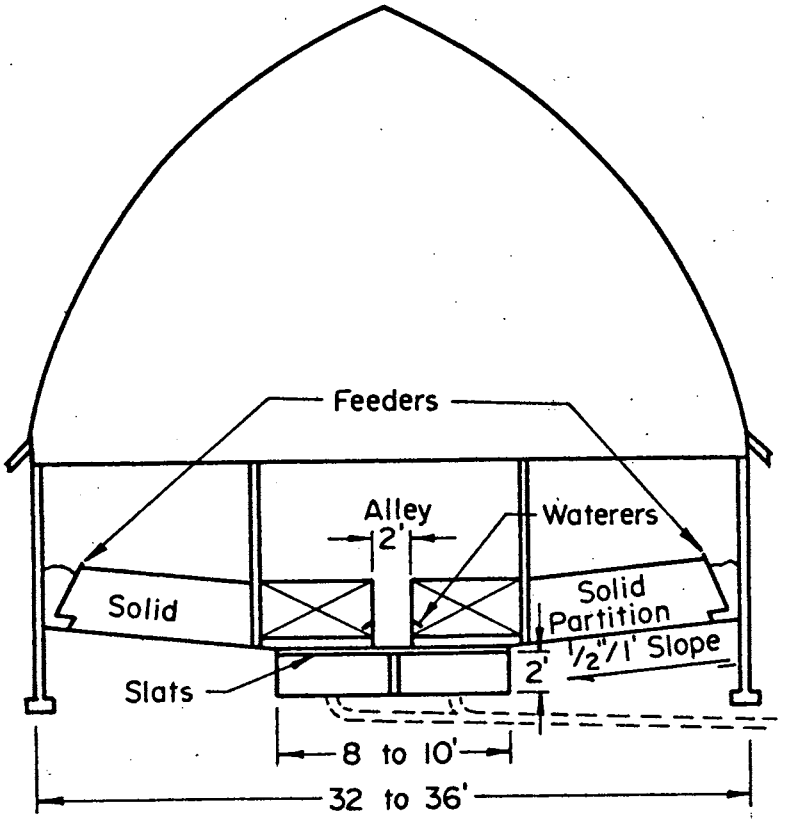


Figure 1

Besides the changes in penning and manure handling, increasing the airflow capacity of the existing mechanical ventilation system is suggested, since more pounds of animals are generally housed in the facility than when the barn was full of dairy cows. General ventilation guidelines are given in the Swine Housing and Equipment Handbook (MWPS-8). It is strongly suggested that mechanical ventilation be used year-round in a remodeled tie stall barn that has a flat ceiling since trying to naturally ventilate, by opening numerous doors and windows, depends exclusively on sizeable wind velocities which cannot always be guaranteed, even in western Minnesota. In the winter time, it is suggested that air be removed from the attic or hayloft to avoid wind effects on the ventilation system. This generally can be accomplished by cutting holes from two to four inches wide in the ceiling between alternate ceiling joists along both long walls in the facility. Summer inlet area can also be drawn from the attic space, or if numerous windows are present, can be provided by cracking them open slightly.

Figure 2 shows a typical remodeled cross section of a free stall dairy facility to house pigs. Generally these barns are naturally ventilated so there is no flat ceiling. Width varies from 40 to 60 feet with two rows of long narrow pens and perimeter alleys generally the best layout scheme. The manure alley is typically down the middle to accommodate scraping using existing center end doors. The same considerations for partitions, waterers and feeders are present in this barn as in the other option, but with ventilation being significantly different.

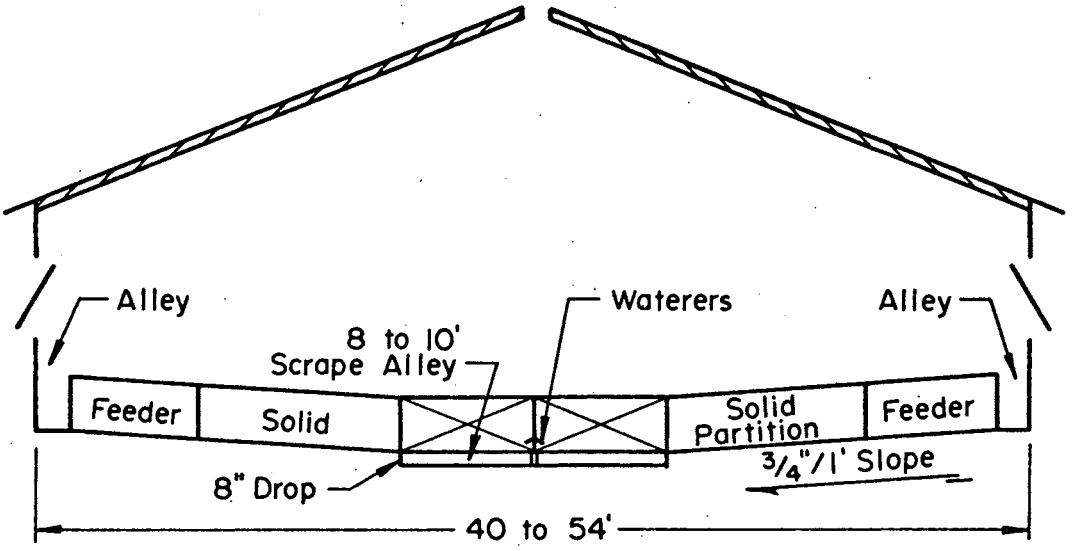


Figure 2

Ventilation of this facility is done, as with dairy cattle, naturally. It is imperative that the underside of the roof be insulated to prevent dripping during cold weather. Insulation of side and end walls are optional, with slightly warmer inside temperatures maintained if done. It is important to protect the insulation from moisture with a vapor barrier and from birds with plywood, which also is needed for fire prevention. The open ridge should be approximately one inch wide for every ten feet of building width with six to eight inch wide ridge openings common.

Manure handling can be done by scraping manure in an open gutter with or without bedding being used. If the bedding option is provided, manure must be handled as a solid and some temporary storage (concrete pad outside of the barn) should be provided to give storage between haul-out. In some cases manure tanks or adjacent holding ponds can receive liquid manure by having that scraped to one end of the barn into a small day pit, which is then drained into the outside unit. Other possibilities are a shallow pit with slats over the top and a gravity drain system, where manure is periodically drained into a similar outside pit or holding pond.

Although the remodeling of old dairy barns into hog facilities are not cheap, generally the cost of such remodeling is one half or less than the cost of building new facilities ($100 to $130 per hog) and can work quite successfully if designed properly to avoid common management problems.

## ODOR CONTROL FROM SWINE LAGOONS AND BUILDINGS

Controlling swine manure odors can be a significant problem for Minnesota hog producers, especially in the spring. This is the time of year when waste holding facilities are emptied either by design or necessity onto cropping lands. This is also the time when outside storage facilities (lagoons) have a natural "spring" turnover. Although these odors are not generally dangerous to human health (exception being manure pit agitation in confinement buildings), they are nuisance pollutants which can cause strained relationships with neighbors and also create an undesirable environment on the farm itself. There are several management techniques available to reduce the odor, thereby creating a better environment for all to live and work in.

The first odor control measure is the initial site selection of both the confinement building and the manure storage unit. This is, of course, uncontrollable for an existing unit, but if facilities are to be built, they should be located in an area of sufficient distance, (at least 300 feet away from residential buildings), and hopefully downwind from either the farmstead house or adjacent neighbors. Predominant winds in Minnesota are from the north and west, thus a site on the east side of a farmstead is generally the "best" location for a lagoon or large confinement facility. Typical summer winds are from the south, which may be of more value since, in the summertime, residential homes may have windows open and odors will be more offensive than during the cold months when they are not as apparent.

Another technique to reduce odor problems on a farmstead involves the design and construction of animal and waste holding facilities. Outside lots should be well drained so that manure is "dried" as quickly as possible, which will reduce odor significantly (see later article on dirt lot design). The facilities need to have manure removed as frequently as possible in scraper systems, or with slotted floors where manure is stored in tanks either underneath the facility or adjacent to it. Covering manure storage units if they are outside is an effective means of greatly reducing odor. The overall management is also critical of any swine production facility making sure a "clean" unit is maintained; not allowing manure tanks to overflow, fixing leaking waters, and keeping manure handling equipment in functional use.

A primary source of odors on some farmsteads is outside storage ponds or lagoons which, in well over 90% of the cases, are "anaerobic", meaning without oxygen. If properly designed and of sufficient capacity (see MWPS-8) these should have minimum odors during the balance of the year, but will have a week or two of "smell" during the spring turnover. Holding ponds and lagoons that are heavily or "slug" loaded are much more likely to have objectionable odors year-round. If at all possible, it is advisable to remove some of the solids from the swine waste before it enters these units. This can be done with settling basins or picket fences. In both single cell or the first stage of a multi-cell lagoon system the unit receiving the fresh manure needs to be emptied generally on a yearly basis by agitation and pumping to remove some of the solids which are the source of the odor. In some cases aeration of this first stage lagoon may provide some benefit for reduction of odor, especially during the spring season.

Almost all of the swine manure produced in the state is placed on cropping fields. This is not only an effective place to dispose of manure, but can provide some very significant fertilizer nutritients (MWPS-8 or PIH-25) to crops. It is however, the most common situation for odor complaints in the

state. From both an odor and fertilizer value standpoints, there are some distinct advantages to soil injection of manure. When this is impossible or the equipment is not available, manure spread on a field should be followed quickly with some type of incorporation (disking or plowing) to cover it, reducing odor and again conserving plant nutritients. Also, morning application of manure is preferred rather than late afternoon as it encourages the drying time during the day, which will reduce odor. One also wants to be aware of wind direction when placing manure on cropland, avoiding manure spreading on a field downwind of a neighbor's residence.

Odor control chemicals are available commercially for use by swine producers in the state. For the most part, these materials have not been found to be as effective as people have claimed. The cost of these chemicals is highly variable, and generally are a fairly expensive alternative to the others mentioned above. Some of these materials have provided some breakdown of solids in manure pits, but have not been as effective in the odor control area.

Control of odor in swine production is a continuing concern and one for which there are no easy solutions. Research is being done in the capture and treatment of odorous gases with soil filter systems, mechanical aeration, and biological and chemical means. These all involve an "industry-like" approach which, although fairly effective, can also be quite expensive. In the meantime, the "common sense" approaches mentioned above are probably the best way of avoiding serious odor complaints by those people living near you, and creating a better situation on your own farm as well.

## AGENT - SPECIALIST TRIP TO 1987 PORK CONGRESS

The 1987 American Pork Congress will be held in Indianapolis, Indianna during the week of March 2, 1987. We are tentatively planning to take a van to the meeting again next year, with a farm and/or industry visit before the meeting. If any County Ag. Agent is interested, please save these dates on your calendar and let me know. I will be contacting those who have expressed an interest in the trip this coming fall, and will need committments by Jan. 1, 1987.

## SWINE DIRT LOT GUIDELINES*

Although confinement housing of swine has increased in Minnesota, there still are requests for unpaved dirt lots for either growing/finishing hogs or gestating sows. As a matter of definition a dirt lot is defined as an area in which no attempt is made to maintain a vegetative cover. Although housing of sows and hogs are not recommended in dirt lots during the winter time in Minnesota this sometimes is done, especially for sows. During the warm weather dirt lots are more of an option with low cost being its major advantage. Whether the lots are used only in the summer or used year-round, there are recommendations to follow which will make such a facility, even though inherently more labor intensive, easier to manage and more successful.

One of the first items to consider in designing of a dirt lot is sight

*Adopted from "Design Considerations for Dirt Lot Production of Swine", by J. P. Murphy and F. R. Bodman. Presented at 1986 American Pork Congress in St. Louis, MO.

selection. It is important to have the lot a considerable distance (at least 500 feet) away from the family living center on the farmstead, or from neighboring farms or residences. In Minnesota a southerly wind direction in the summer and northwesterly winds during other times of the year are common. Thus locating a dirt lot to the east of any residence is the best option. One should also arrange the lots to minimize snow drifting problems and place windbreak or snow fences where necessary to protect the unit without restricting cool summer breezes. One also needs to consider local utilities (water and electricity), even though restrictions are not as great in this type of housing as in a confinement unit. Make sure that there are handling facilities for the hogs as well as consideration for future expansion of additional pens that will compliment the existing layout.

The most important feature of a dirt lot system is proper slope of pens to maintain relatively dry surfaces. Slope of pens should be uniform and from two to five percent which allows the lot to drain satisfactorily without excessive erosion. Very closely tied to slope of the lots is manure management. One must provide some run-off control from the lot and divert this to a vegetative runway or a collection pond to satisfy state pollution control regulations. It is also critical to divert fresh water runoff above and on the sides of the lot to avoid this "clean" water from flowing through the lots. Manure should be removed from the lot at least twice per year which is normally done with a front end tractor or skid steer loader. At that time the lots should be reshaped and any depressions filled in to avoid ponding of water and manure.

The lots need to be fenced either with electric barbed or plain wire, woven wire, hog panels, or high tensile steel. Grass under fences should be controlled with some type of herbicide on a yearly basis. The fences should be at least 32 inches high for growing/finishing hogs and 48 inches high for sows. If sows are housed in these lots with boars an electric hot wire should be installed at the top of a woven wire to control boar movement, or 24 to 30 inches up from the ground to control climbing.

The required amount of space per pig will vary somewhat with soil type, seasonal rainfall and lot slope. If slopes are in the two to five percent range roughly 150 to 200 square feet per pig for grow/finishing hogs is the minimum recommendation. If the lot houses sows a 400 to 500 square foot per sow area is suggested. It is advisable to have a long narrow pen arrangement with a width to length of 1 to 3 prefered with ranges from 1 to 2 up to 1 to 4. A maximum of 50 hogs per pen for grow/finishing animals is recommended with a maximum of 20 sows per group suggested for gestating sows. Feeder space recommendations are similar to confinement facilities with four hogs per feeder hole recommended for grow/finishing and an 18 inch wide feeding stall per sow if a continuous trough is used for gestating lots. With self feeders for sows one space per sow is suggested, and if floor feeding is done 20 square feet of slab area per sow is recommended. One waterer per 10 pigs is suggested with a minimum of two waterers per lot needed. An open-front shelter is needed for both shade in the summer and protection in the winter, with winter recommendations being 6 square feet per finishing hog and 12 square feet per sow and summer areas being 8 square feet and 16 square feet respectively.

Figure 3 shows a "typical" layout of a dirt lot for growing/finishing hogs. As one can see feeders and waterers are located on concrete pads with the ability to fill feeders from outside the lot. A diversion dike is schematically shown "above" the lot to prevent fresh water runoff from flowing through it. This

particular lot is sized for 100 pigs (50 per pen) and shows an open front shelter with an insulated roof. Each lot is 180' x 60' (3 to 1 length to width ratio) with a runoff collection basin shown schematically "below" the lot to catch and contain runoff.

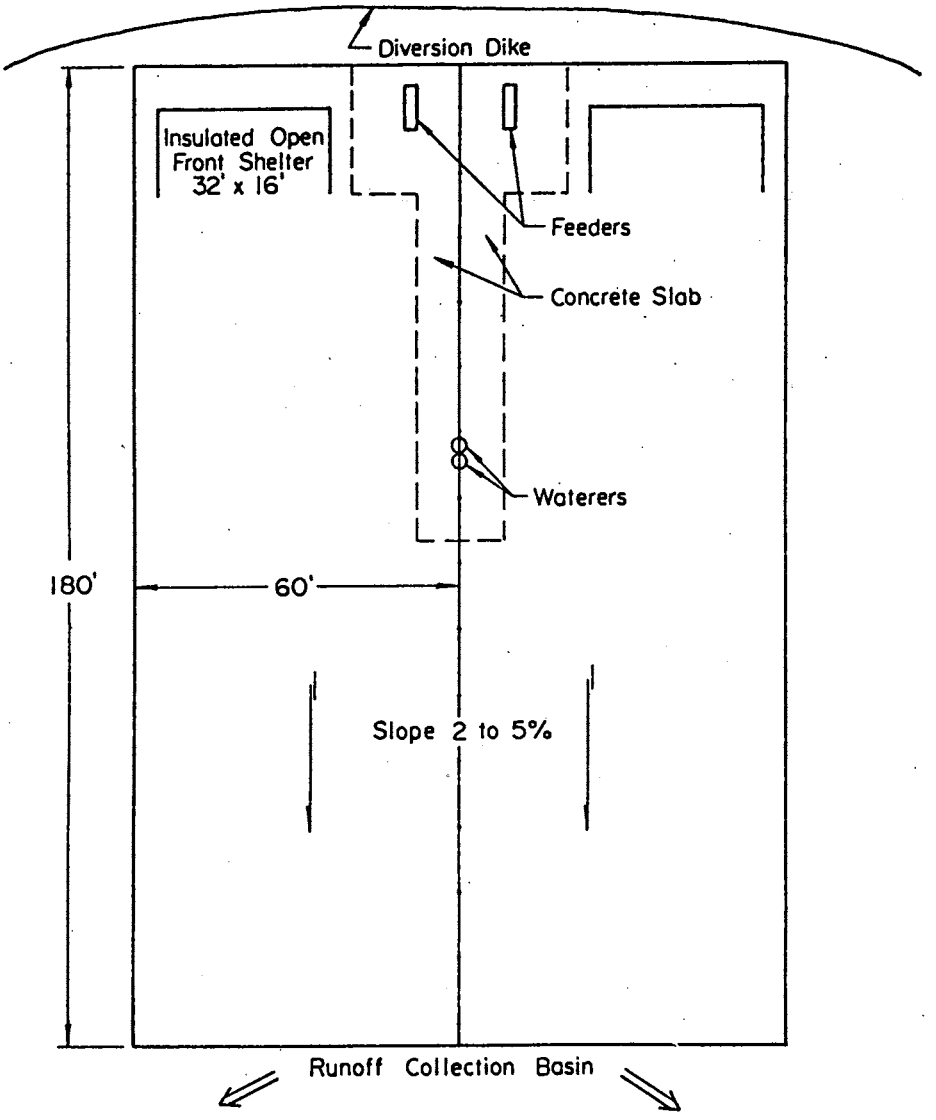


Figure 3

Figure 4 gives a different arrangement for a dirt lot facility for gestating sows with inside feeding for better control of feed intake. A concrete apron in front of and inside the open front insulated roof barn assures the sows of solid footing for feeding and drinking. The gate arrangement allows each group of 20 sows to be feed separately by fenceline feeder or if desired individually with stalled feeders. Again the diversion dike prevents "clean" water from flowing through the lot and the collection basin prevents lot runoff from enetering any nearby streams or ponds.

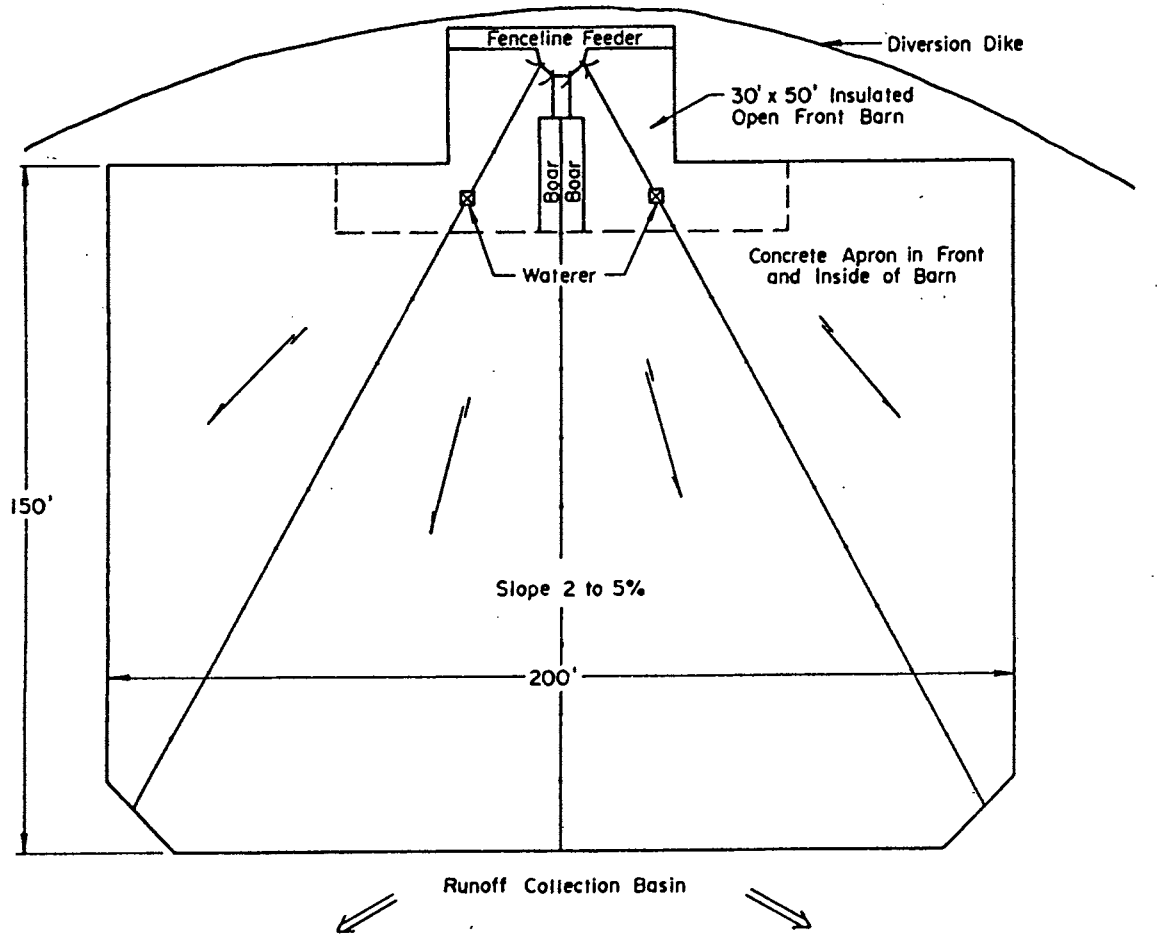


Figure 4

Although confinement housing of swine in Minnesota is still popular and effective, there still are some producers who may prefer a dirt lot system. Costs of dirt lot units, including insulated shelters and runoff control facilities, is between $60 and $70 per pig. This compares with $100 and $130 per pig for modified open front and mechanically ventilated confinement units respectively. As with confinement units, certain design parameters need to be followed so that successful management of the facility is possible and provides the most efficient return on the investment.

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