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1968 NEBRASKA SWINE PROGRESS REPORT

EXTENSION • RESEARCH • TEACHING
FOR SWINE INDUSTRY PROGRESS

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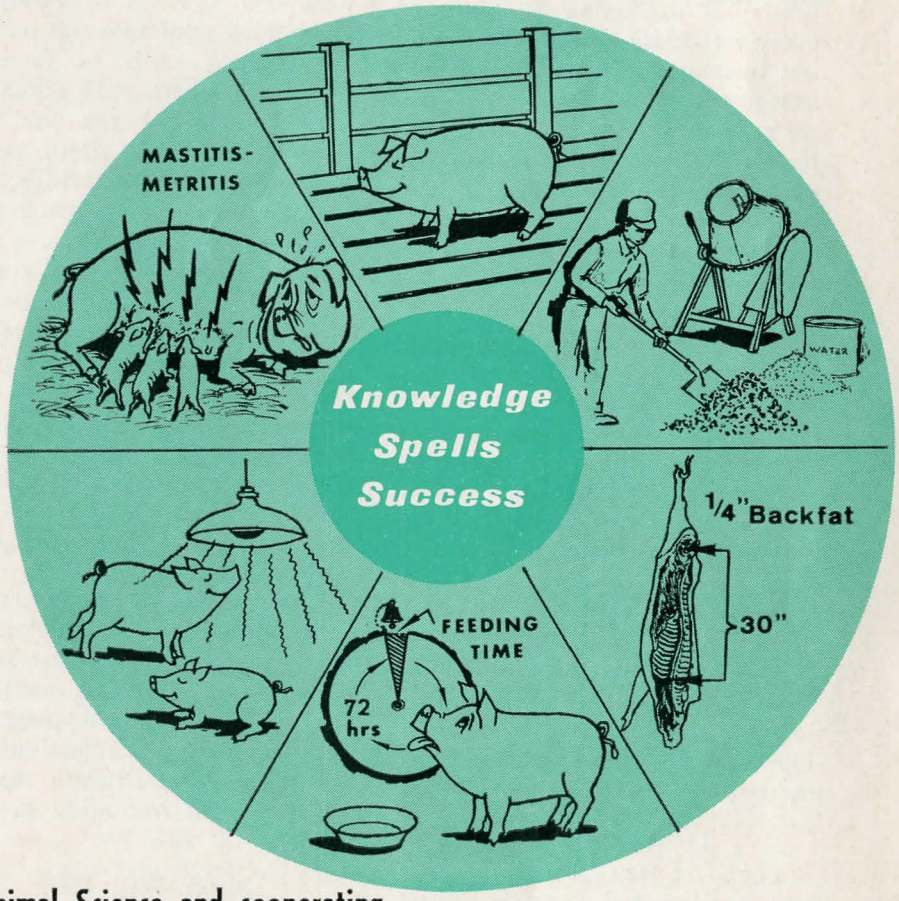


Prepared by the staff in Animal Science and cooperating
Departments for use in the Extension and Teaching programs
University of Nebraska College of Agriculture and Home Economics
The Agricultural Experiment Station
E. F. Frolik, Dean

J. L. Adams
Director of Extension

H. W. Ottoson
Director, Agricultural Experiment Station

F. E. Eldridge
Director, Resident Instruction

WANTED: More Pigs... and Higher Profits

By P. E. Vipperman, Jr.

Assistant Professor, Swine Nutrition, Department of Animal Science

The quickest and surest way to increase the income from your hog operation is to increase the number of hogs marketed. Your profits will also increase if this can be accomplished without increasing the number of breeding animals.

More than 30% of the pigs born alive do not live to reach market weight. Therefore, we have a potential of marketing 10 pigs for every 7 that we now market without increasing our breeding herd.

It is a little optimistic to assume we can cut our pig losses to nothing but we do have the technology to make great improvements in this area.

It is in the first few days after birth that mortality of the baby pig is highest. If these losses are to be reduced to a minimum, good management practices must be implemented before the sow or gilt is bred.

By breeding in groups to reduce any one farrowing period to a minimum, the first and last litters will start with more nearly the same environmental exposure and thereby reduce the chances of loss due to disease.

Once the initial farrowings are grouped, subsequent farrowing periods can be controlled by restricting the weaning period and thus the period for rebreeding.

Treat 'Em Right

The next step is to insure the sow or gilt is fed properly during the gestation period. Gestation rations should contain enough protein, minerals, vitamins and other nutrients which have been shown to be needed to produce healthy pigs at birth. The size and strength of the pig at birth will make the difference.

A bulky, somewhat laxative ration may be fed the week before and the week after farrowing. Although adequate experimental evidence is lacking at this point, there is reason to believe this is an effective preventative of the conditions which lead to the development of the mastitis-metritis-agalactia complex. Ten to 15% beet pulp has given good results for this purpose.

Farrowing stalls or farrowing pens with guard rails should be used to prevent the sow from crushing the pigs. Both systems have been used successfully; however, the pen may be better if the dam tends to be nervous.

Many producers have a tendency to rely too heavily upon modern farrowing facilities to replace the need for adequate attention at farrowing time. This need to check the animals frequently during the farrowing period cannot be overemphasized. Many pigs can be saved if timely assistance is given or if potential trouble is spotted early.

A major factor in baby pig mortality is chilling, particularly on the first day. Among the several reasons for this are his small body size, the absence of adequate body heat regulating mechanisms and the layer of fat beneath the skin which acts as insulation in older swine.

Sirup Will Help

The pig has a limited amount of energy stored in its body when it is born. This must be used to keep the pig warm and to furnish him the energy to suckle. If too much of this meager body store of energy must be used to keep the pig warm, then there will not be enough left to last until it obtains milk.

For example, tests have shown that baby pigs can survive three times as long without food at 90°F as they can at 60°F. Chilled or weak pigs may be fed one or two teaspoons of corn sirup diluted with two parts of water every two or three hours. These pigs must have supplementary heat to pull through.

A treatment developed by South Dakota workers shows promise for increasing the survival of small pigs. They administered about 15 cc of a milk-egg-suger mixture to all pigs which weighed less than two pounds at birth.

Also, if the sow is slow in coming to milk, the weak pigs may be given artificial milk. Extra pigs or orphan litters can be raised on artificial milk if good management and sanitary methods are used. Litters can be evened by transferring pigs from large litters to small ones.

Pigs Chill on Concrete

Since newborn pigs spend a large part of their time lying down, the degree to which heat is lost to the floor is an important factor in the animals' resistance to chilling. Pigs on unheated concrete floors are especially subject to chilling.

Studies show that the heat loss to concrete floors is as great at 86°F as it is to wooden floors at 65°F. A one-inch cover of wood shavings or straw on concrete reduced the heat loss to about that found with wood floors.

Other good management practices that should be followed are:

1. As soon as pigs are born, the navel stub should be coated with tincture of iodine. Needle teeth should be clipped but care must be exercised to avoid injury to the gums.

2. Nutritional anemia or "thumps" in pigs kept on concrete or wooden floors can be prevented by an iron-dextran injection at

birth. A supply of uncontaminated sod or iron pellets in the creep area is also satisfactory.

3. A pig starter ration should be fed to suckling pigs from the time they will eat until the pigs weigh 20 pounds, and then a good complete mixed 16-18% protein ration should be fed until they weigh at least 40 pounds. Some successful hog producers use a highly palatable pig prestarter ration (20-22% protein and high sugar) to get the pigs eating well and then switch to a regular pig starter (usually 18 to 20% protein). This is a must for producers who wean pigs as early as two to three weeks of age (8-10 pounds).

4. Boar pigs should be castrated at one week of age.

5. Nebraska recently entered into "Phase III" of the cholera eradication program. Pigs should not be vaccinated for cholera.

Tough to Be Little

You should keep in mind that the younger and smaller the pig at weaning, the greater the attention that must be given to details of sanitation, environment and disease control. If you decide to wean early, here are some tips:

1. In most cases, pigs should not be weaned before they weigh 10 pounds. Weight and condition are better measures than age.

2. A temperature of 75-80°F should be provided for one- and two-week-old pigs. Solid wall pens will help to prevent drafts.

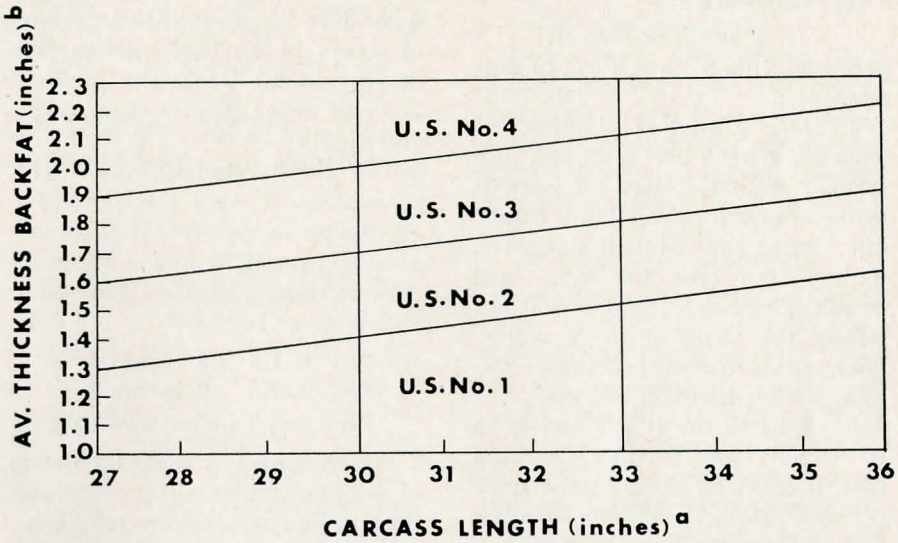
3. Pigs should be grouped according to size and weight and no more than 20 pigs should be placed in the same pen.

4. A well-fortified ration in pig-sized self-feeders that permit easy access to the feed, and clean, fresh water at all times are "musts."

5. All the steps in a good sanitation program should be followed. The combined use of farrowing pens or stalls with early weaning will keep death losses low, save space and save labor.

Remember, the extra time spent at farrowing time and the care you give the pigs to weaning can mean the difference between success and failure.

New standard for pork grading.



[a] Carcass length is measured from the anterior point of the aitch bone to the anterior edge of the first rib.

[b] An average of three measurements including the skin made opposite the first and last ribs and the lumbar vertebra. It also reflects adjustment, as appropriate to compensate for variations from normal fat distribution.

Proposed Pork Grading Standards

By Leo E. Lucas

Agricultural Extension Livestock Specialist (Swine), Department of Animal Science

One of the frequently discussed subjects at pork meetings is the need for new standards for pork grading and the required use of these standards by packers. Many producers and retailers feel there is a real need for updating the present standards for grading pork carcasses because of big strides made by the industry in increasing the leanness of pork. This article is one attempt to review the industry's status and the Department of Agriculture's proposed new grades for pork carcasses.

What Is the Value?

A problem frequently heard by packers is that we (producers) are not paid enough premium for quality hogs.

This argument does hold some water in light of the dollar differences that do occur in pork carcasses. It has been illustrated many times at various carcass shows that $4 to $8 differences may exist between pigs of equal market weights. Yet it is very difficult under most marketing systems to obtain this kind of dollar differences on hogs of equal weights.

Therefore, it has been suggested that a more realistic grading system of pork carcasses would be beneficial in producing more differential in market hogs.

A second reason for uniform carcass grades is a better estimate of carcass quality regardless of the packing plant at which the animal is slaughtered.

Today, because present USDA grades are obsolete, each packer, to an extent, has developed his own grade standards. Consequently, there is a good deal of variation existing in grades between plants. This is misleading to many producers and confusing when they try to evaluate the leanness and quality of their pork programs.

A third reason suggested for carcass grades is the use of these grades in the marketing and merchandising of pork. The thinking here is that if the consumer realizes he or she is buying a No. 1 loin or ham, etc., this would give the consumer confidence in pork products. The beef industry has used USDA grades like prime and choice to designate quality of

(continued on next page)

Pork Standards

(continued from page 3)

produce with a good deal of success.

There is a marked difference at present between beef and pork processing in that nearly all pork is broken down into retail and wholesale cuts at the point of slaughter. This is not true for most beef plants. Therefore, the packer is not selling the chain store or wholesaler pork carcasses, but rather picnics, bacon, hams, loins, etc.

It seems to me if grading is to be effective as a merchandising tool, it must be done at the pork cut level—loin, ham, etc. Rather than selling No. 1 pork carcasses, they would be selling 1,2,3 or 4 loins or hams, the final grade of cut to be based on leanness and quality of product.

Most packers, however, are doing this already with several grades of bacon or hams based on quality and leanness. Many packers feel that brand packaging and promotion in the long run will be more competitive since they are competing with other packers and that brand packaging will be of more total value to the pork industry than a common grade.

It probably can be said that packers in general are doing an effective job of merchandising cured products such as bacon and ham but that there is a lot to be desired in the selling of fresh pork. Possibly there is a need for consumer grading on fresh pork products. No system of grading will be any more effective than the people doing it and their willingness to develop a more effective system of evaluating products.

Pork Carcass Grades

The last revision in pork grades was made in 1955 and grades changed to U.S. No. 1, U.S. No. 2, U.S. No. 3, medium and cull. These standards were designed to divide pork carcasses into groups based primarily on thickness of backfat and carcass weight as reflected by percent of lean cuts (ham, loin, picnic and Boston butt) of the carcass weight.

The three grades of No. 1, No. 2 and No. 3 had indicated carcasses of acceptable quality with varying degrees of fat while the medium and cull were carcasses of unacceptable quality.

The quality grades of No. 1, No. 2 and No. 3 were set to have a 3% range in percent of lean cuts at a given weight and a range of .3 of an inch of backfat. The standards were as follows:

No. 1—1.3 - 1.6 inches
No. 2—1.6 - 1.9 inches
No. 3—2.0 inches and over

Pigs having less than 1.3 inches of backfat under these standards were to be considered as medium.

With the excellent strides toward producing pigs with more lean meat and less fat, many of the meatier carcasses have been falling below 1.3 inches and in many cases below 1 inch of backfat. In fact, most pigs considered for the champion carcass have been below the 1.3 inches of backfat. Because these carcasses had average or above quality with increased leanness, present USDA standards have fallen into disrepute because they failed to meet the needs of today's lean meat production.

Most systems used today for pork grading by packers consider the low backfat carcasses with evidence of meatiness to be No. 1 carcasses unless of inferior quality.

Proposed Standards

Basically, the new standard of pork grading proposes to eliminate the minimum backfat thickness requirement for U.S. No. 1 grade and establish grades for quality (Table 1).

In general under this proposed system, carcasses now graded No. 1, No. 2 and No. 3 would be graded No. 2, No. 3 and No. 4 respectively. The new No. 1 grade would include some carcasses which could not grade No. 1 previously because of too little backfat. The amount of lean cuts and backfat thickness will remain at 3% and .3 inch range respectively within each grade.

Quality of the carcasses will be determined by firmness of fat and lean, color of lean and by amount of feathering between ribs. External fat is not considered as evaluating the quality of leanness.

It appears to the author that the proposed changes in carcass grades are long overdue. The new No. 1 grade may still not be selective enough.

Based on the results of many carcass shows, it seems logical the No. 1 grade should yield at least 38% ham and loin or higher and have a maximum of 1.3 inches of backfat at 30 inches.

It also appears that too much emphasis is being placed on carcass length based on the low correlation of carcass length with percent of lean cut in most data.

Since most packers now record carcass weights, standards based on backfat thickness within carcass weight limits seem more appropriate. Possibly more stringent requirements could yet be included in these requirements.

Summary

Objective precise pork carcass grades can provide useful information to the producer. It seems imperative that if carcass grades are to be used, they should be uniform from area to area and plant to plant. Above all, carcass grading programs must keep current.

Carcass grades are of questionable value to the retailer and/or wholesaler. It appears that grading would have to be on a retail cut basis to be of value for retail trade for fresh pork. Certainly there is a need to develop a better basis for selling pork cuts to wholesalers than by weight alone.

Table 1. Proposed grading standards.

	Yield of lean cuts	*Yield of loin & ham*	*Quality*
U. S. No. 1	53% and over	37% and over	acceptable
U. S. No. 2	52.9 to 50%	36.9 to 35%	acceptable
U. S. No. 3	49.9 to 47%	34.9 to 33%	acceptable
U. S. No. 4	less than 47%	less than 33%	acceptable
Medium	.....	.....	unacceptable

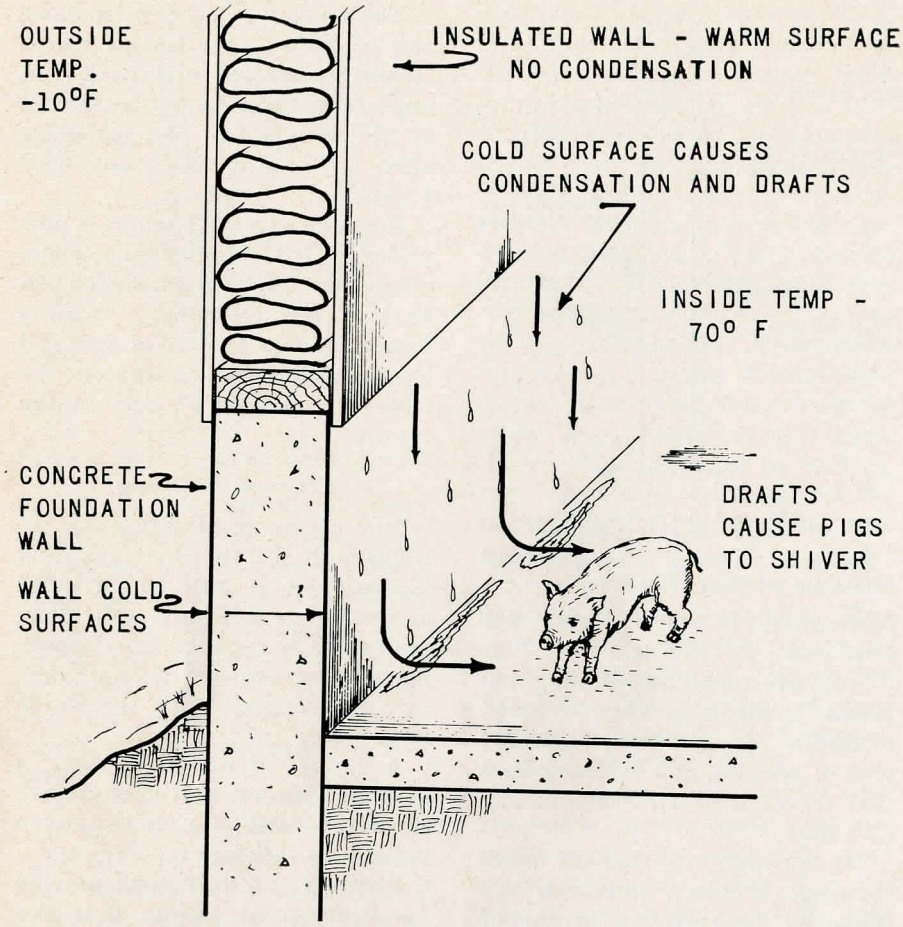


Figure 1. Avoid cold foundation walls in a farrowing house.

New Features, New Ideas

Planning New Swine Buildings?

By E. A. Olson
Extension Agricultural Engineer
(Farm Buildings)
Department of Agricultural Engineering

Several important decisions need to be made before you start building a new farrowing house or remodeling other swine production facilities.

These include several items such as building construction costs, labor available, intensity of use, materials, durability and your system of management.

Other items such as expansion possibilities and problems of modernizing (keeping a new building up to date) will need your careful study and attention to help assure that your business will be productive and profitable. After the building has been completed, changes or additions are costly and often impractical.

The first and most important job is overall planning, before investing in any new facility. Not only is it vital for you to know where you are going in your farming but also you will find that an overall plan makes it easier to reach goals with fewer problems as the plan proceeds.

Your overall plan helps you to identify the management and engineering problems that will come up in your farmstead system.

Your first step should be a careful evaluation of what you now have—considered side by side with what you want to build and the resources you have available or will need to do the job.

Make a list of your decisions on the number of hogs you plan to raise or feed out annually, the number of farrowings per year and the present and future size of breeding herd planned.

Don't forget to include your feeding program, your resources in available capital, labor, feed supply, etc. Talk to your county Extension agent or a person trained in farm management.

Farrowing House

If you need a new farrowing house, let's consider the number of farrowings per year.

If you farrow only twice each year, your building usage will be minimum. Consequently you cannot justify many modern features —such as slotted floors, floor heat, supplemental heat, ventilation system, manure handling—that have the eye of many producers.

While two farrowings per year may fit your farming program, chances are that your litter size for one farrowing may be below average—much to your disappointment—probably because of inadequate facilities.

On the other hand, if you had better farrowing quarters and good management, chances are that you might increase the number of pigs raised per litter by 2, or perhaps 4.

If your labor is available for farrowing four or more times per year, perhaps you need to consider more adequate facilities. This will cost more but the cost per pig may be reduced through greater usage and improved management.

Keep in mind that good facilities alone cannot guarantee results.

Prevent Chilling

Chilled pigs are a frequent problem because of a cold farrowing area.

According to reports, 20% of baby pigs die during the first few hours or days due to chilling or crushing.

Guard rails and farrowing stalls have helped reduce losses due to crushing.

During the first few hours and up to two days of age the baby pigs are in the process of developing their body temperature mech-

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Swine Buildings

(continued from page 5)

anism that will allow them to adjust to different environmental temperatures. Unless they are kept at a temperature of between 90° and 95° F and free of drafts, they will begin to shiver.

Any drafts at temperatures below 90° will have an injurious effect on the pig and will cause chilling and shivering.

Uninsulated concrete foundation walls, single pane windows, a poorly designed ventilation system, cracks around doors, uninsulated doors and air currents from furnaces or supplemental heaters are the primary causes of drafts. An adequately insulated building (with 2½ to 3 inches of insulation in the walls and 3 to 4 inches in the ceiling) will help reduce drafts.

Cold Foundation Walls

Concrete foundation walls frequently extend 1 to 2 feet above the floor. Since concrete is a poor insulator, heat loss through the foundation wall will be very high. This causes a lower temperature near the foundation wall, thereby creating drafts. These drafts cause air currents to flow downward along the foundation wall to the floor where they move along the floor causing the baby pig to be chilled (Figure 1).

When the baby pig is close to the cold wall, his body will lose heat to the cold wall surface. If you stand near a single pane window on a real cold day, you will experience the same sensation.

If the foundation wall was insulated and warm, the problem of drafts would be eliminated (Figure 2).

Windows are also a frequent cause of drafts. This is one reason most farrowing houses are now built without windows.

Costs of Materials

Every swine producer is interested in holding building costs to a minimum. In planning a new facility it should be remembered that first costs can be misleading,

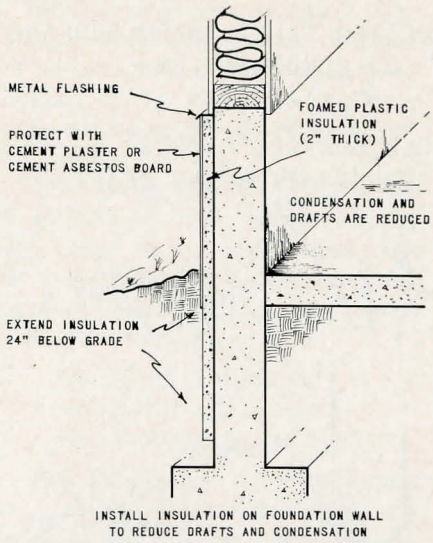


Figure 2. Insulated foundation wall eliminates problem of drafts.

particularly if materials are not satisfactory or durable.

Hogs are rough on building materials, particularly when confined to limited space. This is especially true of growing and finishing hogs that try their sharp teeth on any restraints.

In addition to damage from chewing, building materials are subjected to corrosive action of gasses from manure pits that will attack metals and, in some cases, turn white paint black.

There is considerable evidence that these metal interior linings, in many cases at the best, are short-lived (Figure 3).

The corrosive action of manure and of acids from manure fumes attacks galvanized metals and in some cases holes have been found in wall linings and pen partitions after a building has been used 4 years.

Research at some stations is now underway to determine what metal alloys can be used or developed to resist corrosive action of manure fumes. Perhaps new techniques and improvements in ventilation systems will also be of help in the future.

Plywood Is Strong

The choice of materials for interior wall linings of a farrowing house is not as critical as it is for a nursery or finishing unit. Sows are normally confined in a farrowing stall or pen and do not come in direct contact with the inside wall.

A variety of materials, such as exterior plywood, galvanized metal, concrete and shiplap, have proven to be very satisfactory.

Plywood as a lining will provide excellent wind bracing. It is also a good choice for ceilings because it has excellent structural strength that improves the rigidity of the structure. In choosing plywood, exterior grade "C-C," the least costly, will be very satisfactory. For finishing the plywood, a white stain

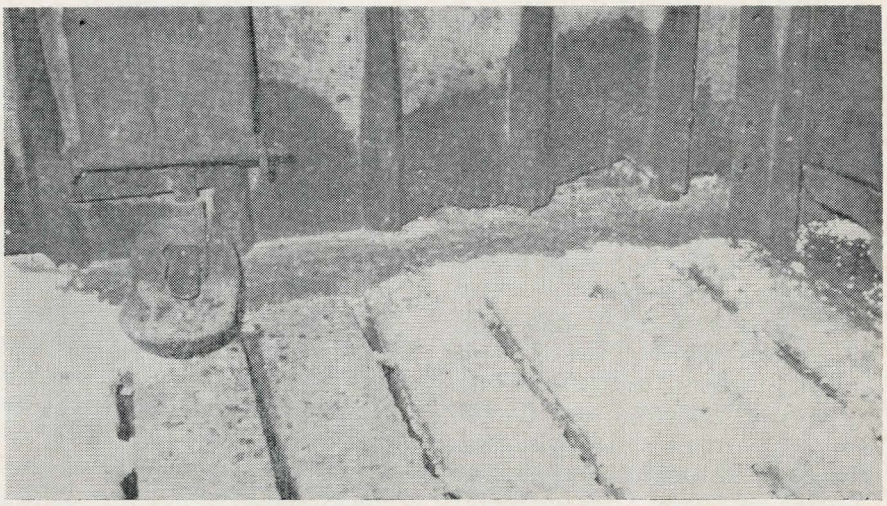


Figure 3. Interior galvanized metal wall lining of a controlled environment swine finishing building after 4 years of use. Note damage to wall lining and metal pen partitions, due to contact with manure and to fumes from manure gases. White material is foamed plastic insulation which rodents have damaged and worked loose from inside walls.

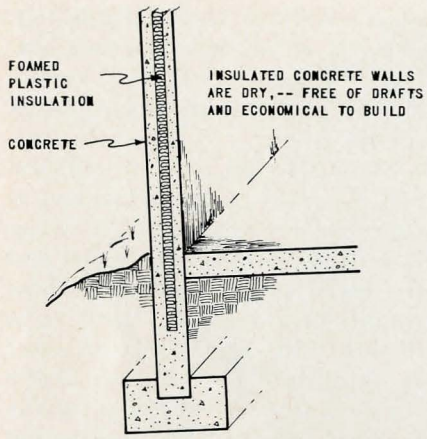


Figure 4. Concrete tilt-up sandwich wall.

—two coats—is preferred rather than a conventional oil base paint.

Varieties of light colored composition boards with attached vapor barrier are also available. They can be used on the ceiling and on the upper part of the walls. However, they do not have the structural strength or durability of plywood.

Tilt-Up Concrete

For growing and finishing buildings, the durability of the interior lining is of primary importance. It should be "pig-proof."

There are two types of wall construction, with desired insulating qualities, that will meet this challenge. These are concrete tilt-up sandwich walls or a concrete block cavity wall (Figure 4).

The tilt-up wall has been tried and proven; it is being accepted by more swine producers as their choice. It is durable, requiring little or no maintenance. It is resistant to damage from the sharp teeth of the hog and it is reasonable or competitive in cost with conventional types of construction.

Concrete is also fireproof and provides excellent positive protection of insulation from rodents. When available, mice and rats prefer an insulated wall nest with plenty of feed, water and warmth such as is found in a swine building. These inviting features, however, are denied in concrete tilt-up sandwich wall panels.

Walls Improved

Since concrete tilt-up swine buildings were first constructed six years ago, many improvements in the construction technique have been developed. This type of construction, because of its many desirable characteristics and low cost, is being used for the new swine research complex now being constructed at the University Northeast Station at Concord, Nebraska.

If you are interested in concrete tilt-up construction, chances are that someone within a reasonable distance from you has a building of this type. Several of your questions can be answered by looking over an existing building and becoming acquainted with this new technique.

Additional information and construction plans are available from your county extension agent or from the Agricultural Engineering Extension Office, College of Agriculture, University of Nebraska, Lincoln, Nebraska, 68503.

Concrete block cavity walls with insulation in the cavity are not being used since they are more costly. When two inches of insulation is used in the space between concrete blocks, they will provide an excellent insulating quality.

Ventilation—A Must

Much progress in providing satisfactory ventilation systems for swine housing is being made. More is needed and expected in the future. Adequate ventilation is an essential for success with controlled environmental swine production.

Don't neglect to include it in your plan with exact details and dimensions of air inlet openings, fan sizes and locations, and other features. This will save both time and money, which for most of us are limited. While a ventilation system may cost more for installation than you may anticipate, it is a must to insure dry, warm, comfortable conditions for swine production.

Plans for Construction

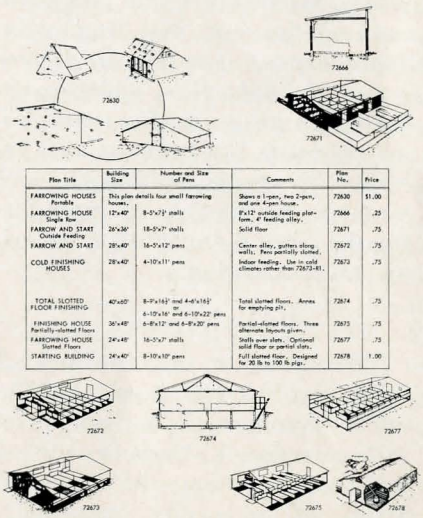
We have tried in this short article to point up just a few of the many details and considerations involved in planning modern swine housing. While you will want to develop plans to fit your particular management system, you may be interested in a series of new swine housing plans recently released by the Agricultural Engineering Extension Office (Figure 5).

These plans include building layouts, construction details and insulation and ventilation recommendations. Such recent developments as totally slotted floors for the farrowing house and liquid manure storage systems are included in the revised plan series.

These plans are prepared by the Midwest Plan Service made up of Extension and Research Agricultural Engineers from the thirteen north central state land grant universities. Through this service, research findings and field experiences are applied to swine building plans such as those described and illustrated.

The competency and talent available for the development of such plans is not available in any other part of the country. Your inspection and use of these plans may help you develop a more efficient, less expensive and more successful swine enterprise.

You may see the plans at your county extension office, at many lumber dealers, or you may write directly to the Agricultural Engineering Extension Office, College of Agriculture, University of Nebraska, Lincoln, 68503.



Plan Title	Building Size	Number and Size of Pens	Comments	Plan No.	Price
FARROWING HOUSES Portable	This plan details four small farrowing houses.		Shown a 1-pen, two 2-pen, and one 4-pen house.	72630	$1.00
FARROWING HOUSE Single Row	12'x40'	8-5'x7½' stalls	8'x12' outside feeding platform, 4' feeding alley.	72666	.25
FARROW AND START Outside Feeding	26'x36'	18-5'x7' stalls	Solid floor	72671	.75
FARROW AND START	28'x40'	16-5'x12' pens	Center alley, gutters along walls. Pens partially slotted.	72672	.75
COLD FINISHING HOUSES	28'x40'	4-10'x11' pens	Indoor feeding. Use in cold climates rather than 72673-81.	72673	.75
TOTAL SLOTTED FLOOR FINISHING	40'x60'	8-9'x16½' and 4-6'x16½' or 6-10'x16' and 6-10'x22' pens	Total slotted floors. Annex for emptying pit.	72674	.75
FINISHING HOUSE Partially-slotted Floors	36'x48'	6-8'x12' and 6-8'x20' pens	Partial-slotted floors. Three alternate layouts given.	72675	.75
FARROWING HOUSE Slotted Floors	24'x48'	16-5'x7' stalls	Stalls over slats. Optional solid floor or partial slats.	72677	.75
STARTING BUILDING	24'x40'	8-10'x10' pens	Full slotted floor. Designed for 20 lb to 100 lb pigs.	72678	1.00

Figure 5. Plans are available.

Serious Problem

Mastitis Metritis Agalactia

By M. J. Twiehaus

Chairman, Department of Veterinary Science

The mastitis-metritis-agalactia complex is one of the most serious problems confronting our larger swine production units to date. The MMA complex is also sometimes encountered in the smaller units. This disease syndrome is not well understood in that in some outbreaks all signs—mastitis-metritis-agalactia—are present while in others only one or two of the signs are observed.

Bacteria found to be associated with mastitis include the Coliform group, Streptococci and Staphylococci species, and, less frequently, *Spherophorus necrophorus, Actinomyces, Actinobacillus,* and *Corynebacterium pyogenes.* The mycoplasma organism has been isolated recently in some outbreaks and found to be capable of reproducing the clinical entity upon experimental inoculation.

Udder Involved

The entire or only sections of the udder may be involved. The udder is congested, hot and firm. Milk secretion is absent or reduced and pigs nursing the inflamed gland will be hungry and usually proceed to rob milk from another gland. The secretions from these infected sections may be watery with some flakes or purulent in nature. Diagnosis is made by keen observation and a close examination of the udder.

Metritis or inflammation of the uterus may be concurrent with the mastitis syndrome. Bacteria reported with puerperal uterine infections are usually of the Streptococci-Staphylococci and Coliform groups.

Some researchers are of the opinion that these infections, metritis in a subclinical form, occur at time of service while the majority of cases probably occur at or near time of farrowing. Signs of infection are observed one to three days following farrowing. A slight to a marked discharge, whitish to yellow in appearance, may be observed from the vulva.

Sows or gilts with uterine infection show a depression with little or no desire for feed. An infected sow is likely to remain in a prone position and frequently is observed to be trembling or shivering. The udder is firm and hot, and milk flow is inhibited. A purple discoloration may be present in one or more sections in severe cases.

Pigs nursing such infected sections may begin to scour and will begin to rob from another gland. Some pigs will die from starvation if the involvement is extensive, while those surviving usually become unthrifty.

Management Important

It is the writer's opinion that management plays a significant role in the MMA complex. Research to date has shown that this disease is a complex syndrome and the causes may vary from farm to farm. The MMA complex may appear as a mastitis alone or a metritis. Cases with both are always more difficult to treat and most frequently encountered. It is this syndrome that I would like to discuss in relation to management.

The distended and congested uterus and the swollen and congested mammary glands are an ideal haven for bacterial infection and the effects of a systemic toxemia. Adequate exercise is conducive to good health, regardless of species.

Many sows or gilts are confined to rather small pens or lots and as they reach the central farrowing house the pens become smaller and the social pressure greater. These conditions frequently result in a disturbed intake of feed and water resulting in a partial stasis of the digestive system that is not usually detected as a distinct constipation by the owner or veterinarian.

This stasis of the digestive tract results in a bacterial buildup in the sow or gilt resulting in a toxemia or bacteremia, or both, at or near farrowing.

These two conditions, toxemia and bacteremia, may have a marked effect upon the endocrine system, resulting in a disturbance of the secretorial cells of the mammary tissue and in no milk secretion. Reproductive organs may show an inertia of uterus and/or a metritis. Also the digestive system is affected, resulting in loss of appetite and further constipation. The end results are mastitis, metritis and lack of milk flow or MMA.

Treatment

Producers should provide clean quarters, a limited farrowing period and adequate exercise, reduce social pressure by adequate feeding and watering facilities, and provide a complete ration that prevents a stasis of the digestive system under the existing program.

A continuing culling program of sows that manifest signs of MMA and those that show an inertia of the uterus at farrowing time is indicated in herds with reoccurrence of this complex.

Breeding gilts to young boars is also suggested to those with a continual problem of MMA.

Treatment varies from herd to herd depending upon the types of bacteria present and their susceptibility to drugs. Combinations of antibiotics and other drugs have proven the most successful.

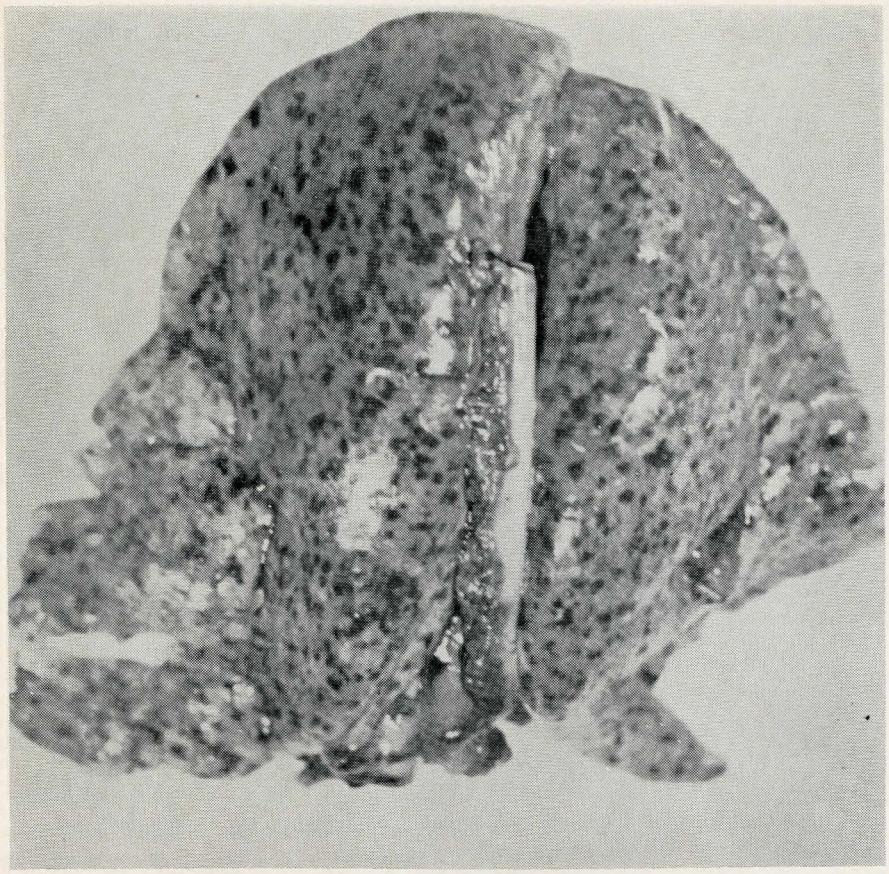


Figure 1. Hemorrhages on swine lungs 96 hours after exposure to migrating larvae of *Ascaris suum*.

Anthelmintics for Swine

By Donald L. Ferguson

Assistant Professor, Parasitology, Department of Veterinary Science

In the past few years an amazingly rapid development of anthelmintic drugs for use in swine has occurred. New compounds, highly effective against specific parasites, have been produced and broad spectrum drugs have been discovered and developed.

When selecting a wormer for swine, the following factors should be considered: Efficacy of compound, spectrum of activity, mode of administration, margin of safety and cost of medicament.

The efficacy of the wormer will determine the success or failure of the operation. It is worthless to administer a product that does not kill or remove worms.

The spectrum of anthelmintic activity determines the number of different species affected by the wormer. Certain swine anthelmintics are highly effective against only one species. If the herd problem involves only one parasite, then the product is worthy of consideration. However, if several different parasites are present in a herd, then a wormer is desired that will effectively remove as many species as possible.

Wide Safety Margin

The earliest anthelmintic drugs required administration directly to the individual pig. By standards of present day swine production, the cost of labor involved in treating pigs individually restricts control programs based on treatment of pigs as individuals.

The wormer must have a wide margin of safety. Toxicity must be low enough so that dosing can be tolerated at levels many times above the suggested level of medication. Recommended doses should be safe for young, old or pregnant pigs and special precautions should not be required in administering it.

Cost of medication is one of the most important considerations in selecting an anthelmintic drug. The profit-minded swine producer must use modern production methods to live within ever-narrowing profit margins. Better swine, better rations, mechanization and growth-stimulating feed additives all help to produce more pork with less feed.

However, swine worms also thrive under these up-to-date production practices. Swine infected with worms will require more feed to produce a pound of gain.

Piperazines

In 1954, two piperazines were brought to the United States from England. The two piperazines were introduced primarily as ascaricides but they also exhibited activity against other parasites in swine, principally the nodular worms. Piperazines are the most popular swine anthelmintics.

Mode of Action: Piperazines were not designed as worm killers. They produce a paralysis in swine ascarids and the live worms are expelled from the pigs.

Mode of Administration: The effective dose is 50 mg. piperazine base/lb. body weight regardless of the salt used. Because both soluble and insoluble preparations are available, administration of these drugs does not involve much extra labor; formulations have been administered effectively in drinking water and mixed in the feed.

Safety: The most outstanding feature of piperazine is its great margin of safety. It can be administered at several times the effective dose with no toxic effects. If administered properly, it can be safely given to pregnant sows to within one month of parturition.

Cost: It costs approximately 3¢

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Anthelmintics

(continued from page 9)

to worm a 50 lb. pig and 9¢ for a 150 lb. pig.

Hygromycin B

Hygromycin B, a fermentation product of Streptomyces hygroscopicus, is an antibiotic that effectively removes ascarids, whipworms and nodular worms from pigs.

Mode of Action: The initial action of hygromycin against internal parasites evidently is directed at the capacity of the females to produce worm eggs. The drug apparently is fatal to the worms but its action seems to be a cumulative one. Rapid expulsion of mature ascarids, so common following piperazine therapy, is not characteristic of hygromycin.

Mode of Administration: Ease of administering hygromycin B is its greatest advantage. It is added to a complete feed or to protein supplement. When administered as a farm-mixed supplement, care should be used since 6,000 units/lb. is near borderline for effectiveness and in a farm-mixed ration this could easily be reduced.

Toxicity: Hygromycin B has a wide margin of safety. But, since it is a streptomycin-like substance, it also has some toxic effects. The incidence of deafness increases as pigs are left on medication for long periods. For this reason, it is recommended that medication be removed after the pigs reach 125 lbs. This allows for recovery of some of the hearing damage produced early in treatment.

Price: Feeding hygromycin B to a pig from 30 to 125 lbs. costs about 22¢ per pig. The advantage is continuous freedom from egg-laying worms.

Organic Phosphates

Organic phosphates are the newest group of anthelmintics. In tests throughout the country, excellent activity has been found against a broad spectrum of worms. Until the recent development of organic phosphates for worming of pigs, a suitable drug for treatment of whipworm infection was not available. It is interesting that the organic phosphates as anthelmintics are derived from insecticides.

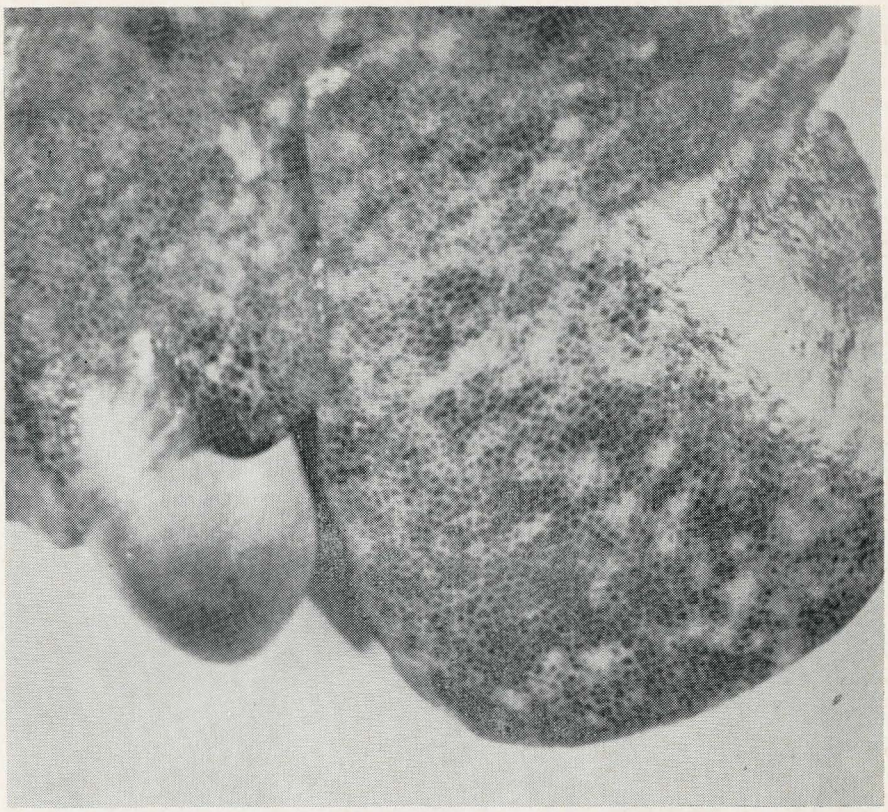


Figure 2. Swine liver after repeated exposure to migrating larvae of *Ascaris suum*.

Mode of Action: Worms expelled from pigs following treatment with organic phosphates are dead. The cholinesterase levels of the worms are suppressed sufficiently to result in the death of the parasites.

Efficacy: Organic phosphates are recommended for removal of ascarids, whipworms and nodular worms.

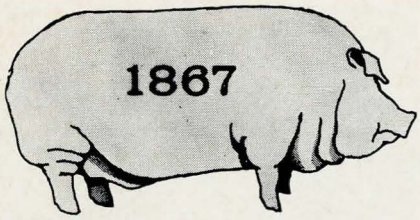
Mode of Administration: Mix the wormer into a meal-type ration shortly before use. Do not store the medicated feed as prolonged exposure lowers the anthelmintic efficiency. Preconditioning pigs by withdrawing the feed for 24 hours is neither necessary nor recommended. Post-treatment purging is not required.

Toxicity: Characteristically the organic phosphates have a lesser margin of safety in the host. The primary action of organic phosphates in the pig is on the nervous system where it depresses the enzyme cholinesterase. Swine showing signs of increased intestinal peristalsis such as that caused by bacterial or viral enteritis, or by certain feeds such as new alfalfa should not be wormed until these signs subside or are brought under control by proper therapy.

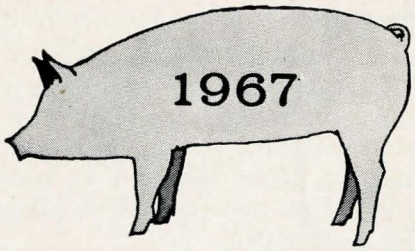
Cost: Swine in Nebraska are consistently infected with numerous ascarids and a few whipworms. Use of broad spectrum organic phosphates has not been accepted by the swine industry as the cost of medication is too high.

Recommendations

To establish an effective worming program, anthelmintics should be used to remove female worms before they reach egg laying age. It takes from 54 to 60 days for an ascarid to grow from the infective egg stage to a mature adult. Worming pigs every 50 days will eliminate adult female worms. Worm at weaning time (6 weeks of age) and again 60 days later (150 lbs.).



Time + Swine = Progress



By R. D. Fritschen

Area Agricultural Extension Specialist (Animal Science) Northeast Station

Swine production in Nebraska in 1867 was reported as 47,024 hogs under one year of age and 13,674 hogs over one year old, with a total value of $350,000.

Since 1867 many changes have been taking place in the swine industry in Nebraska.

Some key problems remain. One manifest problem in all reports was hog cholera. It is of interest to note that after one hundred years of living with this disease producers now have the means to completely eradicate it.

Other problems of 1867 have long since been solved or have lost their economic implication. Many new problems have evolved.

The emphasis on swine production in Nebraska, since 1867, has increased many times from the 60,698 hogs worth $350,000 in 1867 to 4,130,000 in 1966, which does not include breeding stock.

In 1867 hogs in Nebraska depended upon their gleaning ability to survive and saw very little corn while today's hog is the largest market for corn and feed concentrates, consuming about 45% of our annual corn production.

Hogs "Stood Still"

Through the early years the value of hogs varied but little. Their greatest value in early statehood was that of providing food as they were slaughtered locally. Statistics from a 1908 Yearbook of Agriculture reveal their relative importance at that time:

	Number	Value
Horses & Mules	23,816,000	$2,284,469,000
Cattle	71,267,000	1,495,995,000
Swine	56,084,000	339,030,000
Sheep	54,631,000	211,736,000

Swine production in Nebraska grew with the state. Management and housing problems grew with it. The 1908 report stated that "not many years ago, the common practice was to keep hogs in small pens that of necessity become muddy." The report went on to say: "This practice is still common in many sections but where hogs are grown in large numbers the importance of pastures is now recognized."

The McLean County System of Swine Sanitation received its first test in McLean County, Ill., in 1919. This system stressed four principles basic to swine production:

(1) A clean pen.
(2) A clean sow.
(3) A clean pasture.
(4) A clean ride to pasture.

The role of good pasture in swine production is well known. In areas of the country where alternate use of land does not force swine production indoors, pasture will remain a basic component of production.

To pinpoint a year when confinement production of swine had its beginning would be impossible. It is generally agreed, however, that the preceding ten years has witnessed most of the trend to confinement with the past several years seeing the most rapid movement toward confinement.

Two basic reasons are attributed to the confinement trend:

(1) The labor requirement of pasture production of swine remains high while labor availability has decreased.

(2) Production of swine in confinement allows expansion of a farm enterprise without increasing acreage.

University "Moved"

Two years ago the University embarked on a plan to study problems associated with housing and management. The critical need for a study of this nature is evidenced in the accelerated trend toward various forms of confinement. In Nebraska and elsewhere only a limited amount of information was available to guide the producer who was interested in confinement rearing of swine.

The 1967 Swine Production Report announced a new project was being developed at the Northeast Station to study different housing-management regimes. Of the six units programed for this project, two have been completed in late December 1967 and occupied. The remaining components of the project will be constructed in the spring of 1968.

The units that have been erected are part of a two-unit concept involving two more units not yet built. However, the two units that are complete will be used to gather preliminary data.

One unit (Fig. 1) is of the open-front design. Infrared heat will be available to maintain desired production levels in this unit.

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Progress

(continued from page 11)

The enclosed unit (Fig. 2) contains equipment to control environment. In addition, three separate air intake systems have been constructed into the unit to allow for comparison.

Each of the units will feature a floor configuration consisting of three pens each with 25, 50, 75 and 100% of the floor area slotted. Pens are adjustable so that pen size and shape may be studied also.

All units are constructed of concrete and are tilt-up in design. The walls of the enclosed units are fully insulated by bonding two inches of styrofoam insulation between two inches of concrete to make a six-inch-thick wall.

In Review

Six units, three open-front and three environment controlled, are programed for the Northeast Station. Two units are now in operation with the balance of the project scheduled for completion by July 1, 1968. Objectives of the project include:

(1) Compare the effects of open versus closed growing-finishing buildings in a one- and two-unit production system.

(2) Determine the amount of slotted floor required for optimum performance.

(3) Determine the value of supplemental heat.

(4) Evaluate ventilation systems.

(5) Observe and evaluate manure disposal procedures.

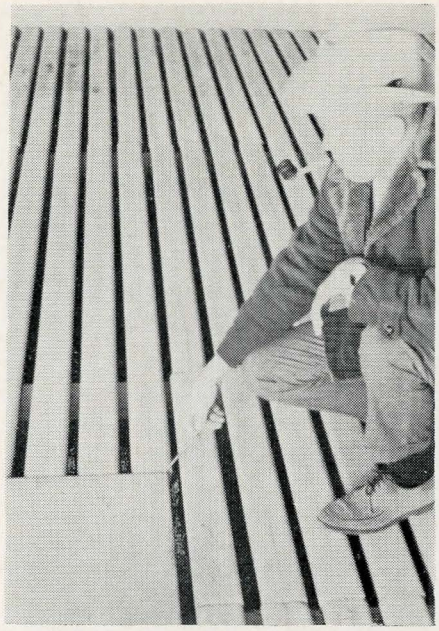

Figure 2. Part of the floor area in the environment controlled unit where the floor is totally slotted in the background and 75 percent slotted in the foreground.

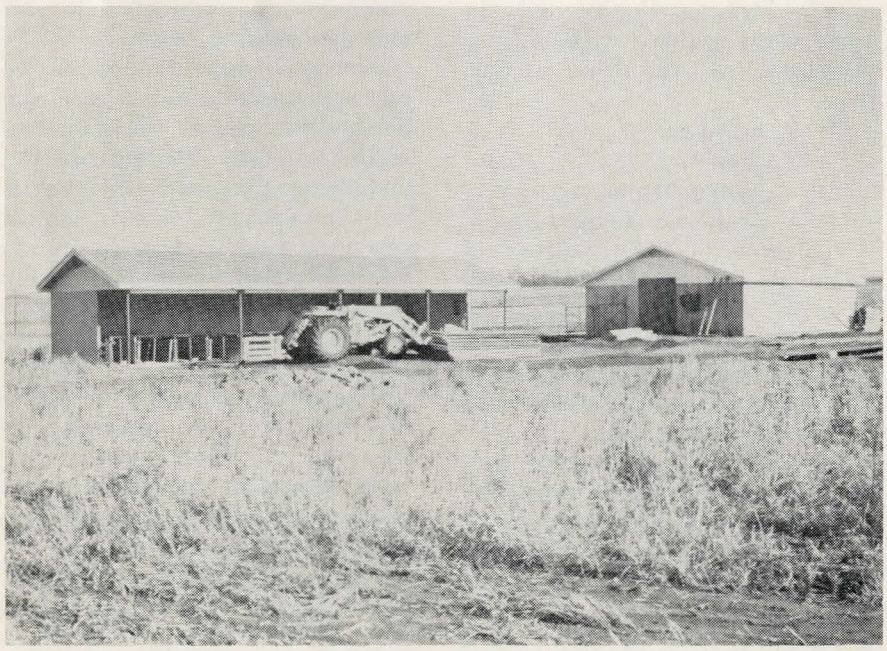

Figure 1. Buildings A (on the left) and C as they appeared nearing completion. Building A is the first of the open front units while C is the first of the environment controlled units.

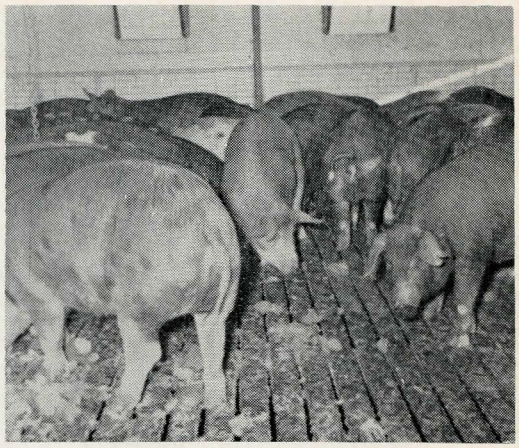

Figure 1. Slotted floors for swine unit.

Slotted Floors for

By Murray Danielson

Assistant Professor, Animal Science
North Platte Station

Slotted floors for swine housing have found increased acceptance in recent years. Incorporation of slotted floors into a new or remodeled swine unit either as a totally or partially slotted floor offers these advantages:

1. Proper design and management can make it easier to keep animals clean and dry.
2. Cleaning time (which ultimately has to be charged to labor) can be greatly reduced.
3. Bedding (which is expensive and often hard to find) may be eliminated.

Slotted floors in most common use have been constructed from either wood, concrete or steel. Slotted floors can be and have been used with varying degrees of success in gestation, lactation, nursery and growing-finishing units.

Growing-Finishing

Growing-finishing units should make maximum use of automation and mechanization, since this is the period in a pig's life when the volume of feed required and body wastes to be handled increase along with the weight of the animal. Therefore, the use of labor-saving equipment and techniques

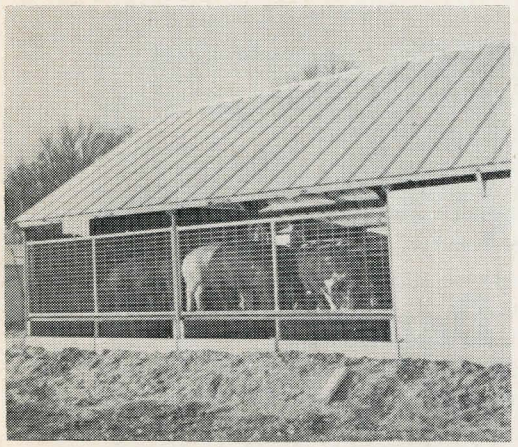

Figure 2. Removable sides of same unit for varying climatic conditions.

Growing-Finishing Pigs

are most important in growing-finishing units.

Recently, portable-type buildings equipped with different types and arrangements of slotted floors have become available. One such type is shown in Figures 1 and 2. Figure 2 illustrates the removable sides of the same unit for varying climatic conditions.

A housing study with growing-finishing pigs was conducted at the North Platte Station during the winter of 1966-67. Three types of housing units were utilized in the study, consisting of:

1. A portable, totally steel slotted floor building as shown in Figures 1, 2 and 3.
2. A conventional shed-type building with adjoining concrete apron.
3. A conventional shed-type building on an earthen dry lot.

Table 1 shows performance of pigs in each of the housing units.

Table 1.—Comparison of performance of three types of growing-finishing units.

	Type of housing		
	Totally slotted	Totally concrete	Earthen
House size	16 x 24 ft.[a]	8 x 40 ft.[b]	2(10 x 16)[c]
Number of pigs	100	100	100
Number pigs per pen	50	50	50
Average initial weight, lb.	60.5	56.4	73.8
Final weight, lb. (84 da.)	183.4	187.8	208.9
Average daily gain, lb.	1.47	1.57	1.61
Feed consumed per lb. gain, lb.	3.95	3.51	4.00

[a] Totally steel slotted floor as seen in Figures 1 and 2. Width 3⅛″ slats spaced ⅞″ apart.
[b] Wooden insulated shed-type concrete floored building adjoined with an 8 x 40 ft. concrete apron.
[c] Two wooden shed-type wooden floored buildings in ½ acre earthen pen.

Each pen of pigs in this study had access to comparable self-feeder space and automatic waterers at all times. They were fed a 14% growing-finishing corn-soy diet during the entire study.

The pigs in the earthen dry lot pens (Table 1) produced the highest average daily gain (ADG) of 1.61 lbs. They also consumed the greatest quantity of feed, 4 lbs., for each pound of gain.

The pigs in the totally slotted units produced the lowest ADG, 1.47 lbs., with 3.95 lbs. of feed required for each pound of gain.

The pigs housed in the units consisting of all concrete floors produced an ADG of 1.57 lbs. requiring 3.51 lbs. of feed for each pound of gain, the least amount for any of the three housing treatments.

A Daily Cleaning

From the standpoint of labor and management, the pigs housed in the totally concrete floored area required a daily cleaning of the concrete apron along with periodic cleaning and replacement of bedding.

The pigs housed in the earthen area required periodic cleaning and replacement of bedding.

The pigs housed in the totally slotted units required no cleaning for the entire study.

Results of this study tend to indicate an increase in performance might be expected in conventional housing over units equipped with slats. However, when labor and bedding costs are considered, the differences in pig performance in this study are not great enough to be significant.

Management definitely plays a role in differences in pig performance in studies of this type and as future studies are conducted the results obtained in this study will not necessarily be duplicated.

Another study was conducted during the summer of 1967 at the North Platte Station with the totally slotted units as previously described. This study was designed to compare the average daily gain and feed required per pound of gain of gilts vs. barrows during the growing-finishing stage of growth. The results of this study appear in Table 2.

Table 2.—Comparison of gilts vs. barrows when self-fed a 14% corn-soy diet in a totally slotted house (91 days).

	Gilts	Barrows
No. of animals per house	50	50
Initial wt., lb.	48.9	49.4
Final wt., lb.	191.5	203
Average daily gain, lb.	1.57	1.67
Feed consumed per da., lb.	5.25	5.71
Feed required per lb. of gain, lb.	3.35	3.42

Lower Average Gain

This study yielded performance of pigs (gilts vs. barrows) as previously found here at the North Platte Station. The gilts show a lower average daily gain but require less feed per pound of gain than barrows.

In summary, our experience thus far at the North Platte Station with various types of growing-finishing pig units indicates slotted floors definitely have a potential in the swine industry.

Budget figures must be studied closely by each individual swine producer and referred to in deciding upon a growing-finishing unit.

It appears that greater emphasis has to be placed on the value of labor than any other single factor when considering new developments in swine production such as slotted floors.

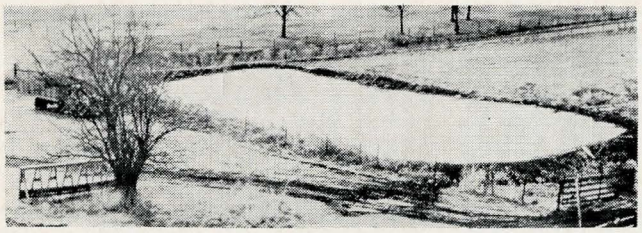

Figure 1. A single basin lagoon system.

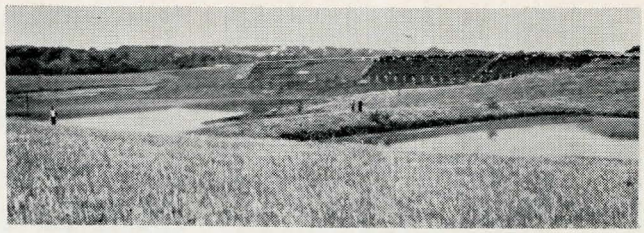

Figure 2. A detention pond-lagoon system.

Systems for Swine Manure Disposal

By O. E. Cross

Associate Professor, Farmstead Engineering, Department of Agricultural Engineering

Within the past ten years livestock production units have increased in size and have become more concentrated. Consequently, producers are seeking improved methods of disposing of farm animal wastes.

Only remote rural areas are not plagued with complaints because of odors or unsightliness of animal production units. Furthermore, the pollution of both surface and ground water supplies by animal wastes is of prime consideration and is receiving attention of various health and sanitation regulatory agencies.

These developments have created a tremendous demand for improved methods of animal waste management.

The "Ideal" System

The era of "getting rid" of swine manure is over. The producer is now faced with a definite management and disposal problem.

The "ideal" system is one which will not interfere with the efficient and sanitary production of the animals. The system must be reliable and not require nuisance-type maintenance procedures. This system would not produce unwanted by-products which would require hauling, handling or unproductive use of the operator's time.

In the operation of the "ideal" disposal system the herdsman will expect the minimum of labor and power utilization. Also, in this economy vein, he will expect the system to have a low initial investment.

This "ideal" system must be designed and operated to prevent pollution of our water resources, to control odors and air quality, and to eliminate breeding places for flies, mosquitoes, etc.

Digestive Principles

All animal wastes contain bacteria which, under proper conditions, consume some of the waste as food and thereby multiply in numbers. During this process the bacteria produce gases, water and other solids.

Although other solids are produced, there is a net loss of solids. This process is called decomposition or digestion of the waste material. The numerous kinds of bacteria are generally classified as aerobic, anaerobic and facultative.

Aerobic bacteria require free (dissolved) oxygen for their reproduction and growth.

Conversly, anaerobic bacteria thrive in the absence of free oxygen and light. These bacteria obtain their oxygen from the food wastes they consume.

Facultative bacteria may thrive with or without free oxygen.

Aerobic bacteria produce water and carbon dioxide and convert nitrogen from proteins into nitrites and nitrates. Some free nitrogen may be released in the process. These "by-products" have a very slight "earthy" odor but are practically free from the obnoxious odors caused by anaerobic decomposition.

Anaerobic bacteria liberate such odorous gases as hydrogen sulfide, ammonia and mercaptan. Methane, odorless, is also liberated.

The products of facultative bacteria depend upon the availability of oxygen. If free oxygen is available, the facultative bacteria take on the characteristics of aerobic bacteria. If free oxygen is not available, they respond as anaerobic bacteria.

All Three Kinds

Manures contain all three of the above kinds of bacteria. If sufficient free oxygen is provided, the aerobes thrive, resulting in a virtually odorless decomposition. However, if free oxygen is not provided, the anaerobes shortly take over and produce the odorous gases.

This means, therefore, that the decomposition process may be altered from one process to the other by supplying or omitting oxygen. If it is desired to operate a digestive system aerobically, oxygen must be supplied almost continuously.

Systems in Use

There are numerous variations in the design and intent of types of systems.

To conserve maximum fertilizer value, the operator should spread the wastes on fields rather frequently. By employing a digestive system, the time between cleanout and spreading operations may be lengthened to years. The systems in the following discussion are digestive or partial-digestive systems.

Lagoons: A lagoon is a pond of water plus wastes (Figure 1). The waste materials are flushed from the holding pit, under the swine house slotted-floor, into the lagoon.

Lagoons are designed as a digestive system where the depth of the liquid and the rate of loading into the lagoon determine the type of bacterial action taking place in the lagoon.

At normal loading rates and a maximum lagoon depth of about five feet, the bacterial action will be basically aerobic. With depths greater than five feet, the deep areas of the lagoon will operate anaerobically while the surface will be aerobic. The aerobic lagoon is more desirable because it is practically odor free but a large surface area is required.

To limit the size of the lagoon it is better to use a deep lagoon, 8 to 15 feet deep. With these conditions, a lagoon of one acre of surface area should digest the wastes of about 200 hogs.

The following points are suggested for the proper management of lagoons:

1. Do not allow surface runoff water to drain into the lagoon.
2. Do not permit bedding of any kind, burlap bags or any floating material to enter the lagoon.
3. Maintain a constant water depth. Load the lagoon regularly. Irregular, heavy loadings overload the lagoon and may cause production of odorous gases.
4. Keep weeds mowed around edges of lagoon.
5. Lagoon should be fenced to exclude all livestock.
6. Heavy loadings in the dead of winter are objectional.
7. It will eventually become necessary to clean out or abandon a lagoon. Numerous factors determine the rate of sludge buildup. Under normal operating conditions, sludge will accumulate at a rate of about 12 cu. ft. per year per animal.

Detention ponds: A detention pond is nothing more than a device, pond or tank, to store waste until such time as it is convenient for disposal.

It is true that during this storage time, digestion may take place.

Figure 2 shows a two-pond system in which the upper pond could be called a detention pond or possibly even a settling basin. The settling basin idea allows the heavier solids to settle out, thereby making the purification of the liquid by bacterial action easier.

The lower level pond in Figure 2 is fed by gravity overflow from the upper pond. The evaporative surface in this case is sufficient to handle all the water. None of the liquid is allowed to flow into natural drainage ways.

Another disposal method would be to use tank-wagon spreaders. In this case the manure slurry is picked up from under the slotted floor or from the detention pond and is spread on adjoining fields.

"Honey wagons" have been around for a number of years and further description of them is not needed.

Rapidly gaining favor in some parts of the country is the use of irrigation equipment to dispose of animal wastes.

The detention tank or pond should be agitated so that the solid waste particles are in suspension. Propeller or hydraulic methods are suggested to achieve agitation. The pump should be of the low-volume, high-head type rather than the high-volume, low-head type used with a "honey wagon" system.

The pump unit should have a chopper attachment to break up large fiberous materials. High dilution of waste is necessary when using this system.

The liquid to be spread should contain no more than about 15% solids. The sprinkler should be in the 100 to 400 gallon per minute capacity. The system should be flushed with clear water as soon as practical after pumping manure. Light but frequently repeated applications are better than heavy infrequent applications.

Still another disposal method is the plow-furrow-cover method. In this method the agitation in the retention tank and pumping into a tank wagon is the same type operation used in the "honey wagon" system.

The tank wagon is equipped with a discharge spout so that one to two inches of slurry is deposited

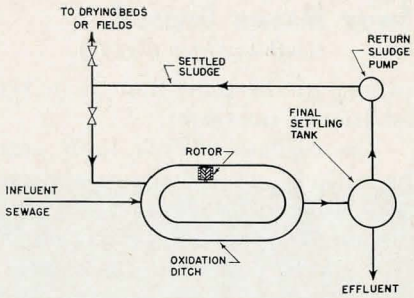

Figure 3. Schematic diagram of an oxidation ditch.

in a previously plowed furrow that is six to eight inches deep.

In a second operation, immediately after deposition, the manure is covered by a moldboard plow as it makes the next furrow.

In this manner about 225 tons of manure may be deposited per acre.

Winter and wet weather use of this disposal method cannot be accomplished.

Pasveer oxidation ditch: The Pasveer oxidation ditch (commonly called oxidation ditch, Figure 4) consists of:

(1) *A continuous open-channel ditch* shaped like a race track which holds the waste.

(2) *An aeration rotor* that supplies the necessary oxygen for aerobic digestion and keeps the contents circulating so solids will be kept in suspension.

An oxidation-ditch system may be operated as a batch system or as a continuous-flow system. The arrangement shown in Figure 3 is a continuous-flow system.

The basic operation of the system is as follows: sewage continuously flows into the ditch. The rotor operates continuously, forcing oxygen into the ditch contents. Overflow from the oxidation ditch passes into a settling tank. Undigested solids settle to the bottom and the liquid (effluent) is drawn off the top of the tank. This effluent) is not pure and must be disposed of by some means as described previously. The sludge may be pumped into sand drying beds or spread on fields. Or, as the figure shows, the sludge could be re-

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Swine Manure Disposal

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turned to the oxidation ditch for additional treatment.

The oxidation ditch itself may be entirely out-of-doors or the pit area under slotted floors may be designed as an oxidation ditch. In the latter case, the rotor is normally placed inside the building and centrally located.

Under normal operating conditions, the oxidation ditch is aerobic and practically odorless. The reduction of solids is good, which means that smaller quantities of undigested solids will need to be handled later.

There are, however, unsolved problems and disadvantages. In cases where the rotor operation stopped for a number of hours, the system soon became anaerobic and odorous. The action of the rotor has at times caused severe foaming and has actually suffocated animals in the pens.

No Perfect System

None of the systems described, or combination of components from different systems, will ever be able to totally digest all of the solids. Consequently, regardless of the system used, the herdsman will sooner or later have to dispose of undigested solids or abandon one lagoon and install a new one.

Compliance Mandatory

Any investment in a production system of any size requires that the investor plan for future expansion and operation. It is a recognized fact that improper disposal of animal wastes may cause serious pollution to the water resources of Nebraska.

The Nebraska Water Pollution Control Council is setting up guide lines for the design, construction and operation of facilities to prevent pollution of our waters. Compliance with those regulations will be mandatory by law.

Individuals considering new installations, or extensive changes in existing installations, should first check with the Nebraska State Department of Health.

Can Sows Eat Every Third Day?

By Alan J. Svajgr

Research Technician
Swine Research Center
Department of Animal Science

A major problem for many swine producers farrowing sows is limiting feed intake during gestation. Excess feed consumption results in greater feed costs and often reduces performance at farrowing.

Individual feeding in stalls has given excellent success in maintaining individual sow condition and good farrowing performance. However, equipment and labor costs increase with individual daily feeding of a measured amount of diet, thus some producers need a more economical method of limiting feed intake during gestation.

Experimental Work

A study was conducted at the University of Nebraska in Lincoln to see if feeding gilts and sows every third day during gestation would result in farrowing performance similar to sows fed daily.

Table 1.—Average gestation and lactation performance of sows.[a]

	Daily-fed	Interval-fed[b]
No. sows	18	17
Da. feed intake, lb.	4.0	5.0
Da. gest. gain, lb.[c]	0.47	0.68
Farrowing rate, %	83	76
No. live pigs at birth/litter	11.5	11.4
Birth wt., live pigs, lb.[c]	3.0	3.4
No. weaned/litter (35 days)	8.5	8.7
Pig. wt. (35 days) lb.	19.3	18.3

[a] All sows fed a 14% protein corn–soybean meal diet during gestation; 16% protein diet self fed during lactation.
[b] Fed 1½ hrs. out of each 72-hour interval.
[c] Difference due to feed intake.

Table 2.—Average gestation and lactation performance of gilts.[a]

	Daily-fed	Interval-fed[b]
No. gilts	35	35
Da. feed intake, lb.	4.0	4.2
Da. gest. gain, lb.	0.70	0.66
Farrowing rate, %	80	86
No. live pigs at birth/litter	10.7	10.4
Birth wt., live pigs, lb.	2.7	2.8
No. weaned (42 days)	8.7	8.5
Pig. wt. (42 days) lb.	29.3	28.9

[a] Same diets as sow experiment.
[b] Gilts fed 2 hrs. out of each 72 hr. interval.

The daily fed sows received 4 lbs. of feed in stalls. The other animals were turned to a self-feeder for 1½ or 2 hours in each 72-hour interval with adequate feeder space for all sows to eat at one time.

Gilts were allowed 2 hours and sows 1½ hours at the self-feeders, with access to water at all times. The sows and gilts were placed on either of the two methods of feeding immediately after breeding.

Results

Behavior patterns of the animals were similar for both methods of feeding. On the average, sows and gilts both ate slightly more feed per day when fed the interval method. Weight gains during gestation and percent of sows farrowing were similar for both feeding methods.

The number of live pigs at birth, birth weights, number weaned, and pig weaning weights were also similar for the two methods of feeding.

Summary

The trials indicate that interval feeding will control feed intake and result in performance similar to sows and gilts fed daily. Most producers have self-feeders which not only decrease equipment costs of buying or building stalls but also may decrease the labor of daily feeding.

Precautions must be taken not to allow feed wastage at the self-feeders. The animals must still be observed daily.