Improving Services and Facilities at PUBLIC STOCKYARDS

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Packers and Stockyards Administration
U.S. Department of Agriculture
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IMPROVING SERVICES AND FACILITIES AT PUBLIC STOCKYARDS

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Packers & Stockyards Administration
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This handbook has been prepared by the engineering staff of the Rates, Services and Facilities Branch, Packers and Stockyards Administration, U.S. Department of Agriculture, with the assistance of the Scales and Weighing Branch, Packers and Stockyards Administration.

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PREFACE

A handbook on ways and means for improving the marketing services, facilities, and methods of handling livestock at public terminal stockyards was issued in 1952. This handbook covers the results of more recent studies and includes suggestions applicable to auction market construction and facilities as well as modifications of the original suggestions to reflect changes in livestock marketing and transportation as well as technical advances in materials and methods of construction.

"Improving Services and Facilities at Public Stockyards" will be of interest to those engaged in the production, sale or purchase of livestock, to the management of public stockyards, and to the operating personnel directly charged with the servicing of the livestock while at the market and with the construction, maintenance, and repair of facilities.

The Packers and Stockyards Administration is concerned with the furnishing of reasonable and adequate services and facilities at reasonable rates, and will on request, provide suggestions to improve traffic flow, minimize shrink and reduce operating costs. Such requests should be addressed to the Chief, Rates, Services and Facilities Branch, Packers and Stockyards Administration, U.S. Department of Agriculture, Washington, D.C. 20250.

(Reference to commercial products and services does not imply endorsement or discrimination by the U.S. Department of Agriculture.)
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INTRODUCTION

The purpose of this handbook is to assist stockyard operators in providing improved services through better design and location of facilities. The suggestions presented are drawn from studies of stockyards throughout the United States, supplemented by conferences with stockyard officials, employees, consignors, buyers, Federal and State agencies, and affiliated private interests.

These suggestions include those relating to the requirements of the Packers and Stockyards Act, 1921, as amended, for the furnishing of reasonable and nondiscriminatory stockyard services from the time livestock are received at the unloading dock until they leave the yards. The Packers and Stockyards Act defines the term “Stockyards” as any place, establishment, or facility commonly known as a stockyard conducted or operated for compensation or profit as a public market—consisting of pens, or other enclosures, and their appurtenances in which live cattle, sheep, swine, horses, mules, or goats are received, held, kept for sale or shipped in commerce.

The Packers and Stockyards Act, 1921, as amended, the regulations of the Secretary of Agriculture issued under authority of that Act, and other Federal and State laws and regulations are referred to in general terms only.

The suggestions are stated in general terms, as local conditions will control the final arrangement and design of facilities and methods of operating. Each yard presents an individual problem due to the topography; size; shape; and location of its land; the fixed surroundings, such as streets, railroad tracks, and packing plants; climatic conditions; livestock receipts and dispositions by weight, class, and species; modes of transportation; hours of arrival; sizes of consignments; sizes of the scale drafts; and other related factors.

Section 304 of the Packers and Stockyards Act, 1921, as amended, provides that it shall be the duty of every stockyard owner and market agency to furnish upon reasonable request, without discrimination, reasonable stockyard services at such stockyard.

In practice, the services rendered by stockyards and market agencies are variable. In view of the variety of services rendered, “reasonable stockyard services” becomes a subject of interpretation which must be determined upon the basis of the surrounding factors. Stockyard facilities must be maintained at an acceptable level of adequacy and sanitation for the purposes for which they are intended by every stockyard posted under the P&S Act.

It is the responsibility of a posted stockyard to provide an efficient market at which livestock can be sold under open, competitive conditions. All rates or charges made for any stockyard services and facilities furnished at a stockyard by a stockyard owner or market agency must be just, reasonable, and nondiscriminatory.

Many public markets are handicapped by outmoded design, size, and arrangement of facilities. These stockyards are confronted with problems resulting from changes in size and location of feedlots and packing plants, methods of livestock marketing, modes of transportation, packer operations, the rapid dissemination of market news by radio, teletype, and television, shifts in population, and changes in economic and labor conditions.

Improvements in the quality and quantity of services and adequacy of the facilities at public markets are often necessary to meet the present-day competitive conditions in the marketing of livestock.

These improvements should be made under a well-developed and comprehensive plan utilizing the latest operating technique and materials which will bring about a reduction in the total
costs of marketing livestock at the public markets, including the costs of selling and buying as well as stockyard operations.

The objectives of such a plan should be to provide the best services and facilities to the customer, increase the worth of the market, and reduce operating costs to all parties. The development of the plan should consider:

1. Immediate improvements in services and operations which can be made using the present facilities.

2. Improvements and changes in services and facilities to be completed within 12 months and which, insofar as possible, can be fitted into and become a part of the improvements and changes made under a long-range program.

3. Improvements and changes in services and facilities made under a long-range comprehensive plan subject to periodic review to meet changing market conditions.

**RESPONSIBILITIES OF STOCKYARDS**

In order to merit continued patronage, to improve their services and facilities and meet statutory requirements of regulatory agencies, stockyard companies should assume the following responsibilities:

They should design their facilities to permit the normal flow of livestock through the market without delay. Approaches to the docks should be of sufficient depth and width and should be provided with adequate surfacing and drainage for reasonable ingress, egress, and maneuverability in the placement of trucks at the dock. Sufficient docks and chutes of proper design should be provided to permit unloading and loading within a reasonable time during days of average high receipts. The chutes should be designed to avoid unnecessary injury or delay in the unloading or loading operation.

Adequate identification or separation of all animals must be maintained to assure proper payment to the seller and proper delivery to the buyer. Receipts should be issued for all livestock received by the stockyard operator.

The flow of livestock should be reasonably direct and designed to minimize bruising and injury of the animals as well as unnecessary shrink. The alleys should be properly surfaced and kept clean and readily accessible to both personnel and animals. Alleys and pens should be designed and maintained to prevent injury to animals. Sufficient pen space should be furnished to provide uncrowded storage of livestock during average high receipts. Pens should be properly surfaced and drained to maintain proper sanitary conditions preventing excessive accumulation of manure, litter, or other foreign matter. Sales pens should be adequately lighted and accessible to prospective purchasers. Adequate feeding and watering facilities should be available.

An adequate number of scales should be located so that the public can observe the weighing, and the weighmaster can have an unobstructed view of the scale platform from his normal weighing position.

Auction arenas should be of adequate size to accommodate all prospective purchasers and consignors who wish to view the sale. The arena should be reasonably clean, provide easy access to and from the seating, and be temperature controlled where necessary. The buyers' seats should be comfortable and provide good visibility of the exhibited livestock and the auctioneer. The arena and seating should be structurally adequate and provide protection from inclement weather. The auction ring should be well lighted, constructed of substantial materials, and should provide a reasonable area in which to exhibit the livestock.

Sufficient truck and auto parking on a properly surfaced and drained site should be provided to accommodate days of average high receipts without excessive use of adjacent roadways. Parking facilities for trucks and cars should not be situated so that they cause congestion of approaches to the docks.

Adequate and clean restroom facilities should be provided.

The office should be clean, well lighted and should be readily accessible to buyers and sellers. Adequate storage for records should be maintained.

Facilities for tagging, testing, and other related purposes should be adequate and properly maintained.

Proper accounting must be made to buyer and seller.

In areas where pooled or graded livestock is handled, lots should be of reasonable size to allow all prospective purchasers ample opportunity to bid.

It is suggested that stockyard companies also
assess the leadership in:

1. Following a definite program for maintenance, cleaning, and systematic improvement of facilities.
2. Settling claims for estrays, mix-ups, and losses promptly.
3. In eliminating undesirable trade practices through education of shippers, truckers, and market employees in the proper marketing and handling of livestock.
4. Enforcing fair regulations governing the use of facilities and the conduct of all people using market facilities.
5. Reviewing, annually or oftener, if conditions warrant, and adjusting or changing the assignment of pens, scales, and other facilities to best serve the operating needs of the stockyard company, market agencies, dealers, market patrons and buyers.
6. Clearly defining, in published rules, the services and functions performed by the market, market agents and dealers, and fixing clear-cut lines of responsibility for safe-keeping of the livestock while on the market.

FACTORS AFFECTING STOCK-YARD ORGANIZATION AND OPERATION

The requirements of the Packers and Stockyards Act, 1921, as amended, and Federal and State laws affecting livestock health, sanitation, brand inspection, weighing, truck waybills, loading of livestock trucks, and separating species and sex in trucks, directly affect the design and location of livestock market facilities and methods of operation.

Special consideration should be given to the following factors in planning improvements in services and facilities:

1. At private treaty markets, the shipper or consignor should have a free choice of designating his selling agent.
2. The shipper should have the choice of selling by the head or by weight.
3. All livestock received on consignment should be sold on their merits and not be intermingled, prior to sale or for the purpose of sale, with the livestock belonging to other parties, except with the prior consent of the owners.
4. The stockyard company should provide proper facilities and trained operating personnel or employ a competent driving agency to drive and deliver each consignment of livestock to their pens. The consignment of each owner should be clearly identified and, when necessary, tagged or marked prior to delivery.

ARRANGEMENT AND DESIGN OF STOCKYARDS

GENERAL

The design of stockyards should provide suitable and adequate facilities to handle consignments and shipments principally by truck transportation.

Yards should be planned and built or rearranged to provide a ready and direct movement of livestock through the market with the least amount of handling, in the shortest time. To reduce labor requirements, truck chutes, pen areas, scales, viaducts, alleys, and gates, should be located and arranged to minimize cross flows, delays, and long drives. All facilities should be of sufficient number and size to prevent bottlenecks in any of the sequential operations.

Where practical, yards should be designed to make full use of labor-saving devices and mechanized equipment for cleaning; for handling, storing, and feeding hay and grain; and for economical maintenance and repair. Driveways of adequate width for the traffic should provide ready access to yards and truck chutes.

When the volume is fairly constant throughout the year and/or peak runs coincide, separate facilities for each species are justifiable. A separation or division of facilities by species, based on receipts, adds size and cost but is partially offset by the reduced cost of handling when the facilities are properly designed for the species.

At yards where peak receipts of cattle, calves, hogs and sheep occur at different periods, it is usually advantageous to have part of the facilities designed for more than one species. Those markets utilizing multiple facilities will still require some separate sorting chutes, feed facilities, and squeeze chutes, designed for a particular species.

RECEIVING AND SHIPPING

The trucker is primarily interested in unloading and checking in without undue waiting, either in line or at the dock. Facilities, designed and located for prompt and efficient unloading and receiving,
will reduce waiting time and the number of truck chutes required. At most stockyards, checkers at truck receiving docks are the first and principal contacts between patrons and the stockyard company. These employees should be selected and trained to handle the work, meet the public, and to create good will. Good service at this point pays large dividends in customer satisfaction.

Figure 1.—Dual height dock for use by pickup and larger trucks, with access steps at end of dock.

All truck docks should be readily accessible from roads or streets. Space should be provided nearby for the temporary parking of trucks away from the dock. In addition, a large hard surfaced area should be provided and reserved for parking livestock trucks while the driver is conducting his business at the yards. This parking area should be conveniently located for the trucker, without interfering with other market operations. Where conditions warrant, suitable restrooms and truck cleaning and washing facilities should be provided at the parking lot.

The size and arrangement of the truck receiving facilities, and the number of chutes should be sufficient to prevent truckers from having to wait in line more than thirty minutes during periods of large receipts.

Truck docks should be substantially constructed; with a minimum distance of 12 feet center to center of chute; and have chute pens of sufficient size to adequately hold the animals from a single deck of the largest carrier normally received. They should have bumpers strong enough for the heaviest types of trucks expected.

The approach should be paved, well drained, and sloped not more than 3 percent toward the dock face to enable the truck to coast into position and be held in contact by gravity. It is recommended that drainage inlets should be 3 feet from the face of the dock so manure from the dock does not clog them and yet the rear wheels of
the truck are forward of the change in pavement slope. The depth of the approach should be twice the overall length of the longest hauling units received, with a minimum of 80 feet.

Figure 4.—Detail of dock and chute construction.

The truck dock should be at the same elevation as the yards or catch pens they serve, as livestock moves to the best advantage on the level. However, when this is not possible, stepped ramps should be used.

Stepped ramps for the movement of animals from one elevation to another have the following advantages over sloping ramps: Animals move more readily; slipping—and resulting splitting and brusing—is reduced; maintenance is cheaper; and stepped ramps are adaptable to steeper inclines.

Stepped ramps may be constructed of steel, concrete or timber. Concrete is recommended because of its long life and low maintenance costs. Steps for cattle normally should have a maximum rise of 4 inches and minimum tread of 12 inches. For hogs and sheep these limits should be 3 inches and 10 inches respectively.

Where fixed height docks are used, the height should be governed by the bed height of the trucks received. The bed heights of small pickup trucks range up to 30 inches; single unit trucks from 39 to 50 inches; and semitrailers from 48 to 54 inches. A dock 46 inches high can be used by most single unit trucks and semitrailers and a height of 28 inches is satisfactory for pickup trucks.

Most markets require at least one multiple deck chute. It may be located to serve both inbound and outbound livestock. Figure No. 6 shows a variable height chute which can serve single as well as double or triple deck trucks. Many other types have been used satisfactorily. Some are built like a bridge with the back end on rollers so it may move forward as it is raised. The front end is held in guides and lifted in a vertical plane by a winch to any height needed. This type chute will fit any truck bed height. Fixed double deck chutes permit livestock from two decks to be unloaded at the same time. When new multiple deck chutes are constructed, consideration should be given to building a variable height chute because of the increasing use of triple and movable deck trucks.

The number and type of chutes to be built will vary greatly between markets. Factors to be considered are: the number of trucks of various types and sizes to be received; the number of trucks that arrive during the peak period; and the average time interval required for unloading each type of hauling unit.

A trailer alley should be provided where low-bed farm trailers are received. This will allow them to enter and leave without backing. These alleys should have no sharp turns. They must be equipped with easily operated gates as they must be opened and closed for each trailer.

Truck docks should be designed to allow all trucks to approach them from the left or driver's side so the driver may have a clear view to the rear as he backs into the dock. Backing into the dock will be further facilitated by painting the chute gates with contrasting paint and providing fixed guide lines in the pavement. These guide lines may be of railroad rail, brick, or white concrete; they should be slightly raised so they are readily visible, but should not interfere with drainage.
Figure 5.—Detail of stepped ramp construction.

Figure 6.—Detail of wooden variable height chute.

Figure 7.—Vertical lift guides in front end of variable height chute.

Figure 8.—Farm vehicle leaving enclosed trailer alley.
Figure 9.—Pickup and trailer chute which swings out behind vehicle after it has driven past, requiring no backing.

Figure 10.—Guide rails set in dock approach pavement.

Where tandem trailers are used, special dock facilities must be provided. These usually consist of a long dock with offset or angled chutes widely spaced so the truck trailer units can load and unload from the side rather than the rear.

Trucker access to the platform should be provided at each chute pen, with steps recessed inside the face of the dock between every other chute. Recessed steps prevent damage from backing trucks.

Gate houses, at which all trucks stop and where all waybills are filled out or checked by company ticket writers, are used by some yards. These houses should be located some distance ahead of the dock and built similar to a highway toll booth. The use of such booths helps to assure legibility and correctness of the waybill, speeds up the unloading procedure at the chutes, and maintains a measure of control over dock usage.

At some markets where the use of a gate house is not practical, two market employees may, during periods of heavy runs, walk down the line of trucks and fill out the waybills and place tags on the animals in the trucks. This also has the added advantage of discouraging unauthorized buying or soliciting activities in the waiting line of trucks.

Crippled and dead livestock should not be unloaded at regular truck chutes. Separate facilities should be provided at each truck dock for the unloading and prompt handling of cripples with a minimum of further damage to the livestock. Dead livestock should be unloaded as soon as possible.

Chute Pens and Chute Alleys.—Animals are unloaded from the hauling units directly into chute pens. These pens should be large enough to hold the animals from a single deck of the largest carrier normally received.

Additional pens back of the truck chute pens may be necessary for temporary holding of livestock to insure prompt unloading and receiving during peak hours of receipt, and for assembling livestock for delivery to sales pens. Special one animal pens should be provided for the temporary holding of bulls. These bull pens should be not more than 3 feet by 8 feet with a gate on both ends.

Temporary holding pens should have one alley for driving the livestock to them and another alley for removing the stock. This enables receiving and driving to the sales pens at the same time without cross flow. All drive alleys should be designed to
prevent cross flows of livestock and interference with other market operations.

The entire truck receiving facilities should be well lighted for night operations, with particularly good lighting over the chute pens and sorting facilities.

Where climatic conditions require, the chutes and chute alleys should be covered with a roof extending at least 4 feet beyond the face of the dock. The roof should be high enough to clear the highest trucks permitted in the area by at least 48 inches. This height will permit the raising of vertical lift truck tail gates.

Truck Shipping.—Separate truck loading facilities are desirable at some yards, and essential where the volume of truck shipments is large or loading out interferes with receiving.

Truck shipments usually move by larger trucks than inbound receipts. Most of the outbound docks should be 46 inches high, although some lower chutes are necessary to accommodate small local trucks. These should have a dock height of 28 inches.
one chute to facilitate the dividing of loads by truckers as well as to better utilize the area of the 12-foot chute width.

The same criteria for determining the number of single deck, double deck, and variable height truck chutes as used in “Truck Receiving” applies to truck shipping facilities.

*Rail Receiving and Shipping.*—Any new rail facilities should be located so that the movement will fit the present planned flow of livestock with a minimum of interference.

The number of single, double, and triple deck chutes should be determined by the normal peak demands, and all new chutes should be spaced to accommodate the longest stock cars on any railroad.

The dock platform should be at least 4 feet wide. Where ramps are required in the chutes, they should be constructed with steps recommended under “Truck Receiving,” on page 5.

Pens for servicing through livestock shipments (stopping only for feed, water, and rest) should be convenient to the unloading facilities. At some yards, where the volume of such shipments is not large, the chute pens can be equipped with feed and water facilities.

The livestock received and shipped by rail at many yards can be loaded and unloaded at one dock. Where a separate shipping dock is required, it will be advantageous to provide shipping pens adjacent to the dock for holding and assembling the livestock prior to loading.

*Tagging Chutes.*—Tagging chutes should be located near the receiving dock. They should not be over 3 feet wide and should be long enough to handle at least five animals at one time. A personnel walkway raised about 18 inches should be built the length of the chute on the outside of the chute fence. This walkway will permit yard employees to place identification tags on animals. Where volume warrants, a double chute can be built with the walkway in between the two chutes. The location of the chute and direction of flow should be integrated with the general flow pattern.

### SCALES AND WEIGHING

One of the most important functions a stockyard performs is the accurate, impartial and efficient weighing of livestock. Adequate weighing facilities contribute directly to economical and efficient yard operations, and the accuracy of weights is an important element in the yard's reputation.

The key facilities of a stockyard, therefore, include the livestock scales and their accessory pens and alleys. Basic requirements for these facilities are well established.
Scales must be consistently accurate, and of the proper size and weighing capacity.

The number and location of scales, and the sorting and yarding facilities must be adequate to accommodate the flow of livestock with minimum delay and congestion.

Weighing must be performed accurately by reliable, well-trained personnel, and the true weight values must be recorded by a mechanical printer on scale tickets.

Accurate recorded weights must be the controlling factor in all weighing operations.

**SELECTION**

*Number and Location.*—The number of scales provided by a terminal or out-weight auction market should be sufficient to assure that, during periods of heavy receipts, all weighing can be completed within a reasonable time after livestock is sold.

Adequate weighing facilities should be provided at terminal markets for dealers and for direct shipments to packers by either separate scales or regular turns at commission scales as conditions warrant.

Scale locations should be adapted to the planned movement of livestock through the yard.

Scale layouts should provide suitable sorting pens or facilities in front, and adequate catch or yarding pens in back of the scale. The catch pens and their alleys should be designed and arranged for prompt, efficient yarding of livestock after weighing.

The scale platform and entrance and exit pockets should be under a roof. Provisions should be made for effective protection from wind and inclement weather which might adversely affect weighing accuracy or damage scale parts. Sufficient lights for adequate illumination of the entire scale area, scale house, and sorting and catch pens should be provided.

*Type.*—Design and construction of livestock scales should conform to the basic principles adopted by reputable manufacturers of large capacity scales. Scales of modern two-section design, with cast-iron or welded steel levers, suspension bearings, and structural steel weighbridges are recommended.

The installation of one-half of a four-section motor truck scale merits careful consideration, because of the latitude it offers in locating the indicating element.

For weighing small drafts or single animals, a self-contained or an "A" type lever scale may be used.

*Figure 15.*—Straight lever scale.

*Figure 16.*—Pipe lever scale.

In recent years several lever-tronic scales have been installed at public stockyards. This type of scale incorporates an electronic load-cell and instrumentation with a conventional lever system. The electronic weighing principle has proven to be practical and, in some respects, advantageous.

*Capacity.*—The weighing capacity of a scale and the platform size needed for rapid and efficient weighing of livestock under present-day conditions differ greatly from that required when most livestock was consigned in carload lots. The weighing capacity and platform dimensions should be directly related to the size of the average draft weighed. The recommended scale capacity per square foot of platform is 110 pounds for cattle,
70 pounds for calves and hogs, and 50 pounds for sheep.

At markets needing large capacity scales for weighing carload lots, studies indicate that 95 percent of such drafts can be weighed on a 30,000 pound capacity scale having a 24- x 12-foot platform.

Figure 17.—Type “A” or truss lever scale.

Figure 18.—Large capacity scale—western market.

A small scale platform generally contributes to greater efficiency in handling and weighing livestock, and to economy of operation through reduced operating, maintenance, repair and testing costs.

Markets handling a large volume of calves, hogs, or lambs weighed singly or in small drafts should seriously consider installing a single animal scale with the indicating element graduated in 1-pound increments. This would result in a higher degree of accuracy, and should appeal to both buyer and seller.

INSTALLATION

Scale Pits.—Scale pits should be of concrete construction, with steel angle copings around the inside top edge of the pit walls, and be well lighted with permanent lights. The pit entrance should be constructed so that the lever system can be inspected while the scale is being used.

The pit should be well-drained, with a concrete floor sloped to a drain and/or sump located near the pit entrance. Sumps and sump pumps are recommended over sewer connections, to avoid flooding caused by clogged or backed up sewers.

The pit depth will depend on the size and type of scale and weighbridge girders. It should not be less than 48 inches deep—measured from the bottom of the weighbridge girders to the floor of the pit.

All main load-bearing piers should be of concrete, poured monolithically with the walls or tied to the walls with reinforcing steel. Piers and footings should be extended below local frost lines.

Scale Levers.—Installation of the scale levers should be performed or supervised by a competent scale erector, preferably one representing the scale manufacturer. All levers should be level and properly aligned. All bearing assemblies, connections, steelyard rod, beam rod, and other parts designed to be plumb should be installed in proper vertical alignment. Adequate working clearances should be provided around all live parts.

Scale Platforms.—Scale platforms should be waterproof. Concrete platforms, scored or well roughened, are recommended. The use of ground limestone, sawdust, or wood shavings provides adequate traction for livestock. A roughened asphalt surface on a wooden platform or asphalt plank can also be used. Where cleats are used, they should be of metal or sturdy wooden construction, in the form of a hinged grid which may be raised for cleaning and testing operations.

The platform should be supported on structural steel weighbridges, and edged with steel angles, channels, or “Z” bars. It should have a clearance of not less than ½ inch from the pit wall, and be constructed to prevent loose material from lodging
between it and the walls. The use of “Z” bar copings on the platform accomplishes this purpose, and also provides a suitable place to attach the stock rack. Undercutting or beveling the sides of the platform is also recommended.

**Stock Racks.**—Stock racks should be substantially constructed of wood or metal, firmly anchored to the platform and be well braced. They should have at least 3 inches clearance from all adjacent structures, and be “fenced” or “walled-off” to prevent interference during the weighing.

Gates should be attached to the stock rack, designed for rapid operation, and equipped with rugged, positive latches. Entrance and exit gates at the ends of the rack are preferred, although entrances at one end with a side exit at the opposite end is satisfactory. Gates at each end allow a straight-line flow of livestock across the scale. This arrangement requires minimum labor in driving livestock on and off the platform. Gates on the side of the rack near the center are not recommended, as this often results in the “pocketing” of livestock at one end of the platform. This requires additional labor in driving on and off, and creates problems in protecting the stock rack from outside interference.

**Scale House.**—Scale houses should be constructed to provide a heated and well-lighted working space for the weighmaster. The windows facing the scale platform should provide the weighmaster with a clear, unobstructed view of the scale platform including the on and off gates. A modern two-way intercom system with an additional loud speaker in the yards to aid in yarding, is strongly recommended. Pipe speaking tubes provide inadequate communication and are not recommended. An electric signal bell or similar device should be installed so the weighmaster may conveniently signal for the removal of livestock and for balancing. At markets where the weighmaster operates the indicating element from the auction box, he should be positioned so that the weighing operation is performed in full view of all interested parties.

**Indicating Elements.**—All livestock scales are required to be equipped with a type-registering weighbeam, a dial with a printer, or a similar device which prints or stamps weight values on scale tickets. The indicating element of a livestock scale must be graduated in intervals of 5 pounds or less, and should be mounted on a solid foundation—preferably concrete—-independent of the scale house structure. In some instances, an enclosure which separates the weigher and the indicating element from the main part of the scale house is desirable. However, such enclosures must not obscure the view of interested parties.

**Weighbeams.**—Weighbeams equipped with type bars are the simplest and most common device for indicating and printing weight values. Weighbeams with multiple notch engagement of the poise reduce notch wear, improve weighing accuracy, and are recommended. The steelyard rod or beam rod connecting the lever system to the weighbeam should be installed to prevent outside interference.

**Balance Indicators.**—The use of a good balance indicator—properly installed and adjusted—on weighbeam scales improves the speed and accuracy of weighing, and is recommended. The installation of a graduated over-and-under indicator, for use as a balance indicator on a livestock scale, is not desirable.
Automatic Indicating Elements.—Mechanical dials equipped with electrically operated ticket printers are operating satisfactorily at many public markets. Some lever-tronic scales (a combination of load-cell and mechanical elements) have been installed with electronic dials and electrically operated ticket printers. These complex and delicate mechanisms require an expert scale mechanic for installation, cleaning, adjusting, and general servicing at regular intervals.

Automatic indicating elements offer several desirable features. These include push button controls for balancing the scale and printing scale tickets, and special security features which prevent printing of a weight unless the scale is correctly balanced when empty, or until movement of the indicator has been reduced to the practicable minimum.

Visual Weight Indicators.—Various devices are being employed at many public markets to provide buyers and sellers with visual weight information at the time of weighing. These include illuminated remote digital scoreboards or lamp bank indicators, digital average-weight scoreboards or lamp banks, and even closed circuit television. These remote weight indicators may be operated either manually or automatically.
MAINTENANCE

Proper maintenance of weighing facilities is of particular importance to assure weighing accuracy and prevention of delays in weighing service.

The scale should be serviced regularly by a competent scale mechanic. The scale pit should be kept clean and dry. The pivots and bearings should be packed with a protective grease. When this grease becomes hard and dirty, it should be removed and the parts repacked with fresh grease. All structural steel in the pit should be kept clean and well painted to prevent corrosion. Weighbeam notches and poises should be kept clean, and weighbeam bars and face plates kept clean and legible. A fabric or synthetic cover is recommended to protect the indicating element when not in use.

TESTING

Scales subject to the Packers and Stockyards Act, 1921, as amended, are required to be tested at least semiannually by a competent scale testing agency, which is equipped with sufficient test weights to test scales to the maximum capacity to which they can be used. At many markets the average draft of livestock is relatively small. However, occasionally these scales are used to weigh as much livestock as the platform will accommodate, and should be tested accordingly.

Provisions must be made when scales are installed to permit ready access to them for large capacity scale testing equipment. The approaches to the scale should be level and on the same plane as the scale platform.

(Additional information on testing procedures is available upon request from the Packers and Stockyards Administration, USDA, Washington, D.C. 20250 or any of its area offices.)

OPERATION AT A TERMINAL MARKET

Weighing services of reasonable quality usually require that commission firms be assigned the use of specific scales, with definite weighing turns arranged according to a known and established schedule. This equalizes scale use and assures livestock consignors reasonable, impartial, and equitable treatment. Where commission scales are used for weighing dealers’ livestock and packers’ direct shipments, definite allotments of scale use for this purpose should be made.
Scale time assignments should be made to eliminate long drives, minimize delays, and, insofar as possible, assure the efficient utilization of weighing facilities and personnel.

Scale time allotted should be proportional to the volume of receipts and to the number of head per draft. Provision should be made for equitable rotation. Such time schedules should be worked out in cooperation with market agencies and controlled by the stockyard company.

Excessive shrinkage results from unnecessary delays and handling in weighing. Livestock should not be held in alleys while waiting for weighing turns and should not be sorted out of the scale pocket. Assignment of weighing turns to each commission firm, and the use of sorting pens in front of each scale will eliminate these conditions. Commission firms should be required to furnish the manpower needed to expedite driving livestock to the scale, sorting them, and preventing weighing delays unfavorable to the interest of livestock consignors.

Delays in driving animals from scales to pens are a common cause of delayed weighing service and often cause a serious bottleneck in yard operations. The efficient use of adequate catch pens and the cooperation of livestock buyers are necessary to eliminate weighing delays caused by unnecessary segregation in yarding and holding and by congestion at the scale exits. Trained and supervised

Figure 25.—Recommended layout of pen areas, before and after weighing.
crews for yarding off the scales contribute to efficient service.

"Turn-on" men and "ticket writers" can be employed to increase weighing efficiency when the traffic volume justifies their use and where suitable sorting and yarding facilities are available.

Weighers, because of the important nature of their duties, occupy positions of particular responsibility. They should be carefully selected on the basis of their proven integrity and capability, and should be closely supervised to make certain they perform their weighing and recording duties conscientiously, impartially, and in accordance with the official weighing instructions of the Packers and Stockyards Administration. At yards where several scales are used, the weighmasters should be rotated between scales at intervals of 1 to 3 weeks.

Scale tickets are the formal, original records of livestock weight and count. They should be serially numbered, and be of proper size, form, and composition to provide durable and legible records, and should provide all data specified by the official regulations. Voided scale tickets should be kept to provide a complete sequence of serial numbers.

**FENCES**

Cattle fences 5 feet in height are recommended. This height, which can be built with posts 8 to 9 feet long, is satisfactory. Wooden fence rails should be constructed with five pieces of 2 by 6 inches or four pieces of 2 by 8 inches, and hip rails of two pieces of 2 by 6 inches or one piece of 2 by 10 inches.

A split post fence is shown in Figure No. 27. The chief advantages of this type construction are that the fence boards cannot be pushed off from either side and there is a significant saving in lumber by the elimination of the hip rails. The strength of the post is not weakened by the splitting, and construction is not difficult. However, a few details must be noted for successful use: (a) When round posts are used a minimum diameter of 6 inches is recommended and the two halves must remain mated. (b) Spiral grain posts should

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**Figure 26.** Cattle fences.
not be used. (c) If round posts are used, they should be sawed, drilled, and the two halves and the spacer block for the bottom wired loosely in place before treatment. (d) Treated sawed lumber may be used in place of the round posts. It is recommended that a minimum of 3 by 6 inch lumber be used for each half of the post. (e) Pressure treatment with a high quality preservative suitable for outdoor use is recommended after all holes and cuts are made.

Round line posts for cattle pen construction should have a minimum diameter of 6 inches; square line posts should have a minimum size of 6 by 6 inches. Corner and gate posts should have not less than 8 inch minimum diameter or a sawed size of 8 by 8 inches.

In the cattle division, the line posts preferably should be spaced 5 to 6 feet but never more than 7 feet. A spacing of 5 feet, 4 inches makes economical use of 16-foot lumber. Corner and gate posts should be set 42 to 48 inches deep and line posts set 30 to 36 inches deep. If pen areas are unpaved,
line posts should be set at least 36 inches deep and corner and gate posts should be set 48 inches deep. The dirt should be well tamped for the full depth. A concrete collar around the posts at ground level helps hold the alignment of the fence. If the collar is extended 6 inches above ground level, it will protect the post. Fence rail splices should be staggered so that no more than two splices are on any one post.

Post pressure treated with a good quality preservative suitable for ground contact will have a substantially longer life than untreated posts, especially in open pen areas.

Consideration should be given to purchasing posts slightly longer than needed. This will permit setting the posts at varying depths in all parts of the pen area and then cutting the tops at a uniform elevation to provide a neat appearance.

Concrete posts and fences, including prestressed types have not proven satisfactory.

Steel posts, fences, and gates of various available structural shapes have not been economically successful.

Salvaged oil well casings and sucker rods are being widely used in the Southwestern United States. Welding is the most satisfactory method of fabrication of both fences and gates from this material. It is satisfactory if it is painted or treated with coal tar. The tops of the posts should be closed to keep out moisture. A concrete collar extending above the ground level—even in paved areas—helps prevent rusting at the ground line.

Either new or good quality used treated railroad ties make satisfactory line, gate and corner posts.

Consideration should be given to the use of pressure treated preservatives in fence and gate lumber. Treated lumber can be particularly advantageous in pens open to the weather. For further information on treatments, see the section devoted to Preservatives on page 42.

Typical wood fence construction and rail spacings for hog and sheep fences are shown in Figure No. 30.

With the exception of length of posts and number of fence rails, fences for hogs and sheep follow the same recommendations as those set forth for cattle fences. A height of 36 to 48 inches is recommended for hog and sheep fences.

In roofed hog and sheep divisions the spacings of fence posts will depend on column spacing. Six-inch round posts or sawed 3 by 6 inch posts used as split posts, spaced 5 to 7 feet, are recommended.

Ample space for drainage and for cleaning

Figure 29.—Fence and gates constructed from used oil well pipe and sucker rods.

Figure 30.—Detail of hog and sheep fences.
should be provided beneath all fences. The lower fence rail should be at least 4 inches above the top of the paving or ground level for all species.

PENS

There should be sufficient pens for all marketing operations, and they should be of varied sizes to fit the needs of each operation—receiving, selling, holding and shipping. The sizes of the pens must be suitable for local conditions and should be determined by a study of the sizes of consignments and scale drafts, and the needs of the sellers and buyers.

The following number of square feet of clear pen area per head of livestock—exclusive of mangers, water troughs and other pen appurtenances—is recommended as adequate pen space for the proper showing, selling, holding and feeding of the various species:

<table>
<thead>
<tr>
<th>Species</th>
<th>Sq. ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>25</td>
</tr>
<tr>
<td>Calves</td>
<td>12</td>
</tr>
<tr>
<td>Hogs</td>
<td>6</td>
</tr>
<tr>
<td>Sheep</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Where animals are not fed, watered or shown in the pens and are yarded only for short periods of time, the pen area used per animal may be reduced by 40 percent.

Well lighted and ventilated covered pens should be provided where climatic conditions or the customs of the livestock trade require such facilities. Under average conditions, pens and paving under roofs will last considerably longer than those in the open, and maintenance and cleaning costs are reduced. These economies should be weighed against the initial cost and maintenance of the roofed structures.

Pens should not be over twice as long as their width—except for single animal pens such as bull pens or those used for after-sale yarding at auctions.

Feeding and watering facilities should be provided in before-sale pens where animals are normally held longer than 4 hours and in those after-sale pens where animals are held overnight or longer.

In pen areas where mechanical manure loaders are used in the regular cleaning operations, a concrete wall at least 18 inches high can be constructed in the rear fence line. This will serve as protection for the fence and posts and speed up the manure loading operation.

MANGERS

Under most conditions, 1 lineal foot of manger per adult animal will be ample for feeding. Where grain or ground feed is used, the same length of feed trough per animal as that for hay mangers is recommended. The trough should be 12 to 16 inches wide and 4 to 6 inches deep.

Pens should be numbered for identification. Considerable thought should be given to the numbering system and allowance should be made for future expansion. Regardless of the size of the market, a simple, logical system will benefit the operators.

Numbers should be a minimum of 4 inches high. Stencils are recommended for uniformity of size and style. Contrasting colors such as white on black and luminous numerals are especially helpful to keep them legible at night and in bad weather when natural light is reduced.

STEEL AND WOODEN SLAT MANGERS

Figure 31.—Steel and wooden hanging slat mangers.
Slat mangers for cattle should have 5-inch openings between slats; those for sheep should have 3-inch openings. Slats for this type manger may be constructed of wood or steel rods. For sheep, welded wire reinforcing mesh can be used in place of the slats.

Hinged slat mangers are less likely to injure animals or be damaged because they will give on contact. They can be hooked in the “up” position for clearance of mechanical cleaning equipment.

In some parts of the country, feed is chopped or pelletized and mixed with additives such as sorghum to make the feed more palatable and nutritious. These mixes cannot be fed in slat type mangers. Trough type mangers similar to the metal water troughs in Figure 37 are used. Because of the light weight of these troughs, the fence attachments can be made detachable rather than fixed for portability and ease in pen cleaning.

Box mangers constructed with bottoms several inches above the surface of the pen are subject to rapid rot and decay as manure collects under the box and damp hay collects inside. This can be eliminated when treated lumber is used and the design permits easy cleaning. In paved pens, the type of manger shown in Figure No. 32 can be built without a bottom.

**WATER TROUGHS**

For cattle, a standardized water trough of approximately 60-gallon capacity is recommended for pens up to carload size. Two or more of these troughs may be used for very large pens.

Each pen should be equipped with a separate trough, or one trough may serve more than one pen if lids are provided for each pen. A single water hydrant may serve as many as four water troughs.

![Figure 33.—Float-controlled, electrically-heated water trough serving four pens.](image-url)
All metal water troughs should be hot-dip galvanized for rust protection.

Troughs with an elliptical cross section permit easy cleaning and are not easily damaged by freezing.

Overflow pipes provided with slots approximately 1/2 by 1 inch at the top of the pipe are effective in preventing clogging by hay and other debris.

The top of the cattle troughs should be not less than 16 inches nor more than 26 inches above the pavement. Concrete troughs ordinarily should be set directly on the pavement or on a full concrete base. The bottoms of sheet metal troughs for hogs...
and sheep should be at least 6 inches above the pavement.

Sections of concrete or metal pipe, approximately 30 inches in diameter and set vertically, are satisfactory for small cattle pens when provided with a watertight bottom allowing approximately 18 inches depth of water.

Commercial float control devices for water troughs are available where the cost of water is a major item or a charge for sewage treatment is based on water used. Where freezing weather is a factor, several gas and electrical heating devices for troughs are available.

ALLEYS

Alleys should have a minimum width of 6 feet and a maximum of 12 feet with the exception of fire lanes which are usually 14 to 20 feet wide. If mechanized equipment is used, the minimum width should be determined by the maneuverability of the equipment.

Alleys over 12 feet wide require long gates that are costly to build and maintain. These alleys are too wide for easy driving and sorting. They also reduce the available pen area. The average pen gate will not close a wide alley without the use of a wing gate or an “A” frame.

All alleys should be designed to eliminate bruising and injury to livestock. “A” frames and wing gates should be avoided in designing new facilities and those in use should be eliminated.

Pen or sorting alleys should be at right angles to drive or delivery alleys where used. The drive alleys, scale alleys, and main alleys serving as fire lanes should be free of pen gates. Where possible, the troughs and mangers should be located to provide a clear side of the pen for unobstructed in and out movement.

For smoother and more economical operation, auction markets should provide separate alleys and pens for before and after sale yarding. This will assist in creating a uniform tempo throughout the sale. This is important to hold buyers’ interest and will usually require fewer employees. At many markets, it is advantageous to furnish separate unloading and loading facilities. This is especially...
true of those markets that unload and load during the sale.

Stepped ramps should be utilized in alleys that have a slope greater than 8 percent. See “Truck Receiving” for detail of stepped ramps.

GATES

Wherever possible, the pen arrangements should provide gates opposite each other and the open gates should be of sufficient length to close the alleys. All gate openings should be located in a corner of the pen and hung to permit the easiest movement of livestock into the pen. The division of large pens by interior fences and gates does not provide adequate operating facilities.

Gates should be standardized as to design, height, length, and hardware for economy where possible. Gates should be hung 4 inches above paving or ground level. Gate stops having sharp corners should not be used. Pieces of 1½-inch pipe—from 2 to 3 feet long—with flattened ends, bolted to the posts, make excellent bruise-free stops. Parts of used automobile tires also make effective bruise-free stops.

Gates should have a balanced design to prevent twisting and distortion. They should be strong enough to hold the various kinds of livestock. Balanced wooden gates should be designed with compression braces, double stiles and braces, and should be bolted as well as nailed. Bolt ends should be clipped and other projections removed to prevent injury to livestock. Lightweight materials reduce the need for heavy gate posts and hardware.

Metal gates should be welded and all sharp projections eliminated. The most commonly used material is new or used pipe. Welded metal gates do not need tension or compression braces, but an additional stile added to the hinge end will add to the life of the gate.

Gates manufactured of tubular aluminum alloys are available and give good service as pen gates or short alley gates. However, they are easily damaged by mechanized cleaning equipment. They are usually difficult to repair; welding them requires special equipment. Aluminum gates have the advantage of being light and do not require an extra strength hinge post or excessively heavy hardware. They do not rust, rot, or need painting. Aluminum alley gates as shown in Figure No. 47 are available commercially.
Prefabricated steel stiles, as shown in Figure No. 48 are also available commercially. They should be hot-dip galvanized to prevent rusting.

The wooden rails and tension brace may be added by the stockyard company at the time of fabrication, reducing freight costs. The gates may be built any length needed.

Short gates—up to 8 feet in length—made of 3/4-inch marine plywood are satisfactory for use in pens holding small animals. They eliminate the need for stiles and braces if clevis type hinges are used. They do not sag, are thin, and lay flat against the alley fence when open.

Gates which may be opened or closed from either end can be constructed from various types of special hardware which is commercially available.

GATE HARDWARE

Standardization of gate hardware can lead to better designs and more economical fabrication.

The heavy usage that gate hardware receives in stockyards makes most commercial hardware—designed for farm and ranch use—unsatisfactory. However, special heavy duty hardware is available commercially or can be fabricated locally.

Round screw pintles or hangers have a tendency to turn and pull out under heavy usage. The turning may be corrected by welding a thin strap to the hanger and then nailing or bolting the strap to the post.

Cast iron and forged hinges are satisfactory but may be costly and difficult to obtain.

Welded hardware is very satisfactory. It is strong and uses a minimum of metal.

Double-strap hinges are generally satisfactory and economical. Hardware which enables a gate to be opened from either end is available and is recommended in cases where there are heavy flows of livestock in both directions. Generally, these hinges work on the principle of movable pins which become the latch when a lever is operated. The opposite end remains the hinge. The operation is reversed when the opposite end is opened.

This hardware is expensive and requires considerable maintenance. It also requires thoughtful handling as one end must not be unlatched until the opposite end is securely latched.

Eye hooks, eye chain hooks, and bull-nosed chain hooks as illustrated in Figure No. 51, used with Jay-bolt staples, are very satisfactory. Bull-nosed chain hooks cannot be loosened by livestock.
Compression Braces - lengths to 12 ft.
2-1x10 and 2-1x6 Rails, Double 1x6 Stiles & Braces
Bolted

HOG GATE - 3 1/2 FT. FENCES

Figure 43.—Detail of 42-inch gate.

Figure 44.—Well designed wooden gate.

Figure 45.—Steel dock gate with adjustable extension.

Figure 46.—Well designed steel gate.

Figure 47.—Tubular aluminum gate with double hinge stiles.
5-2x6 Rails 2-1/4"x2"x56" Steel Braces
2-1/4"x2" Steel Tension Braces
Hinges may be welded as well as bolted

GATE FOR 5 FT. FENCES

Figure 48.—Wooden gate with steel stiles and braces.

Figure 49.—Homemade gate hardware.

Figure 50.—Homemade gate latch with spring-loaded plunger.
Large commercial refrigerator latches make good scale gate closures.

Wood or metal slide latches are widely used and are economical to fabricate at the stockyards and easily maintained.

A spring-loaded, self-closing slide latch which can be operated by a lever extending above the top of the gate is particularly good for stockyards that use horseback riders as they can be operated easily from horseback.

**ROOFED STRUCTURES OVER PENS**

Treated pole-type structures have proven to be economical and long-lasting. They usually have wood structural framing for the roof and corrugated aluminum or galvanized steel covering. Some have open sides while others have metal siding on one or more of the sides. If metal siding is used, it should be set on treated lumber, concrete, or masonry walls at ground level to protect it from decay and rust caused by the elements and animal waste.

Metal siding is subject to damage from mechanical equipment and animals, and must be protected by fences or other means. Treated pole-type structures, in which the poles extend into the ground for lateral support, need protection around the poles at ground level to prevent physical damage from machinery or animals. This may be achieved by use of a steel or concrete sleeve extending about 4 feet above the ground level.

For barns other than the pole-type construction, a concrete pedestal is recommended for each pole or post support. An example is shown in Figure No. 53. The pedestal should extend at least 6 inches above ground or pavement level and the top of the pedestal should be sloped from the post. The pedestal will protect the support from water, waste materials and mechanical equipment. The bottom of untreated supports should be treated with some type of preservative. This is a critical point and in most cases is the first area to show signs of decay or physical damage.

In locations where salvaged oil well pipe and sucker rods are available, some yards have welded these to form the framework of structures. Extreme care is necessary to protect the ground contact of the uprights, both inside and out. Rust preventatives should be used on all of the metal.
Numerous other construction materials such as brick, cement-block and reinforced concrete, as well as prefabricated units make excellent structures. However, cost is a limiting factor.

The type of roof design is important where snow or heavy rainfall is a factor. A gable or single-pitch roof of sufficient slope to prevent an accumulation of snow or ice is recommended for stockyard purposes. Where possible, all roof drainage should be to the perimeter of the roofed area.

Various forms of translucent panels are recommended to allow natural light to enter through the roof of pen structures. These skylights help to reduce the cost of artificial lighting.

Patented roof ventilators, or those that are an integral part of the roof design, are useful in reducing temperature and humidity.

In hot climates a bright reflective roof surface helps reduce the temperature under the roof. In some areas of the country no siding, or partial siding, is used on covered pen structures. In such cases, a roof overhang of 4 feet or more will give protection from most storms and provide excellent shade in hot weather.

Roof height is an important consideration. Structures with sufficient height can utilize overhead walkways for viewing penned livestock and are easier to ventilate.

Where no guttering is used, precaution should be taken to prevent roof runoff from undermining adjacent areas.

**SCHEMATIC AUCTION LAYOUT**

The following schematic outlines of an auction market show possible variations in the location of truck docks, auction arena, and pen areas. These basic facilities determine the flow pattern for the...
entire market. Other facilities such as scales, and tagging chutes may be placed at any point in the flow pattern. Markets which are rectangular and approach being square have many advantages. Assume that office, restaurant, and restrooms are in auction building “A”.

**Figure 54.**—Structural steel frame building.

![Dock Diagram](Image)

**Dock**

In

Out

**Figure 55.**—Separate docks in rear.

**Advantages:**
- Less confusion in front of market—area free for parking cars.
- Clear-cut movement pattern.
- No cross flow.
- Shortest possible movement at capacity sales.
- Market can be expanded to either side.
- No interference between loading and unloading.

**Disadvantages:**
- Requires longer access roads to docks.
- Cannot expand to rear without removing docks.
- Observation and control of docks from front office is difficult.
- All animals must move the maximum distance within the market.

Circular flow of trucks around market.
Some dual usage of pens before and after sales.

**Figure 6Jf.**

- Separate docks in front.

**Dock**

In

A

Out

**Figure 56.**—Separate docks in front.

**Advantages:**
- Good movement, no cross flow.
- Below-capacity sales permit shorter movement.
- No interference between loading and unloading.
- Short drives.
- Some dual usage of pens for before and after sale yarning.
- Observation and control of docks from office is good.
- Market expandable to the sides and rear.

**Disadvantages:**
- More confusion in front of market due to movement of trucks, cars and patrons in the same area.
- Parking of cars is restricted in this immediate area.
Figure 57.—Dual purpose docks in rear.

Advantages:
- Truck dock may be located any place in rear of market.
- Less expense, no duplication of docks.
- Fewer employees required to operate than separate “In” and “Out” docks.
- Some dual usage of pens.
- Market expandable to the sides.
- No interference with cars parking in front.

Disadvantages:
- All livestock must be driven the maximum distance within the yard.
- Possible interference of loading and unloading depending on time of arrival and departure.
- Observation and control of dock from front office is difficult.
- Additional roadway is needed to provide access to dock.
- Cannot expand to rear without moving dock.

Figure 58.—Auction in middle of pen area, docks on either side.

Advantages:
- No interference between loading and unloading.
- No cross flow.
- Some dual usage of pens before and after sales.
- Below-capacity sales permit shorter movement.
- Expandable front and rear.
- No interference with cars parking in front.

Disadvantages:
- Requires an overhead walkway for access to ring.
- Requires overhead walkways from office to docks.
- Observation and control of docks from office is difficult.

Figure 59.—Straight-through market.

Advantages:
- Clear-cut, one way movement, no cross flow.
- No interference between loading and unloading.
- Shape lends itself to long, narrow land area.
- Structures over pens more economical because of narrow width.
- Observation of docks is good.

Disadvantages:
- All animals must move the length of market.
- Not adaptable to dual use of pens—one side is used before sale only, and the other side is used after sale only.
- Joint use of labor between docks is difficult.
- Major expansion is difficult.

AUCTION ARENA

Some of the major considerations in building an auction ring are size, shape, good visibility of animals by all concerned, mutual visibility of buyers and auctioneer, ability of sellers and buyers to observe the operation of the weighmaster, ability
of the weighmaster to observe the scale platform, and accessibility of seats.

Figure 60.—Semicircular ring.

The following sketches of various ring shapes illustrate the advantages and disadvantages of each:

Figure 61.—Semicircular ring.

Advantages:
- No corners.
- Good milling of livestock.
- Spectators are equidistant from ring and auctioneer.
- Auctioneer has good view of spectators.
- Large number of animals can be handled in a minimum of space.

Disadvantages:
- Curved construction means higher costs.

Advantages:
- Cheaper to build than semicircular ring.
- More adaptable to most existing facilities.
- Seats not equidistant from the auctioneer.
- Corners impede milling of livestock.

Figure 62.—Square or rectangular ring.

Advantages:
- Cheaper to build than semicircular ring.
- More adaptable to most existing facilities.

Disadvantages:
- Seats not equidistant from the auctioneer.

Figure 63.—Rectangular ring with straight-through flow.

Advantages:
- Cheaper to build than semicircular ring.
- More adaptable to most existing facilities.
- Smooth flow of animals.
- More separation of before-and-after sale movement.
- Easy to move large consignments.
- Easy to clean.
- Larger ring is possible.
Disadvantages:

- Poor milling and unequal visibility of animals due to corners and shape.
- Spectators not equidistant from auctioneer.
- Less seating capacity.

The size of the ring and scale platform should be related to the size of drafts handled. The ring size should be determined by the size of the larger sale lots. The required area should be determined on the following square feet per head basis: cattle, 25; hogs, 6; and sheep, 5½. The scale platform should be from one-third to one-half the size of the ring. An excessively large ring or scale increases costs and slows selling.

In large rings where single or small sale lots are sold, the use of a divider gate in the ring will help speed up the sale. Two sale lots are placed in the ring at the same time, separated by a gate hinged at the auction booth or fence. The auctioneer sells the lot nearest the exit first. As soon as this sale is concluded, he begins selling the other lot. While he is selling this one, the first lot is moved out of the ring, the second is advanced to the side closest to the exit, and a third is moved into the former position of the second. This method eliminates most of the delay between the time an animal is sold and removed from the ring and the next animal to be sold enters the ring. Another advantage is that the animal being sold is in the ring until the sale is concluded, providing a longer displaying time.

Consideration should be given to some type of protective device for ring personnel. An effective, inexpensive protective barrier can be made by installing two round wood or metal posts parallel to the ring fence. These posts should allow not more than 1 foot clearance between ring fence and posts, should be about 4½ feet above ground level, and spaced at least 2½ feet apart. A solid piece of metal or wood can be bolted to the posts to cover the exposed area between them. This will prevent a horn or hoof from passing between the posts. It should be bolted to the ring side rather than the fence side of the posts. This affords protection and allows the individual to reach over or around the barrier to keep animals moving. In a square or rectangular "ring" the corners can be used for this type of protection as shown in Figure No. 62. This also eliminates two square corners that make milling difficult.

Figure 64.—Auction ring with personnel protective shields.

In those areas of the country where heating or cooling is a problem, it is advantageous to have a separate small entrance gate to the ring for smaller species. Solid panel gates help keep out cold air and prevent animals from becoming excited by the spectators before entering the ring. If solid panel gates are used, a small window or opening is desirable for employee vision when the gate is closed. These gates may be of the sliding or hinged type. In either case, extra heavy duty hardware should be used because of intense usage and abuse from animals.

The floor of the sales ring should be paved to provide solid footing for livestock and facilitate cleaning. Paved surfaces should be scored or roughened and covered with sand, sawdust, wood shavings or a combination of these to keep the animals from slipping on the base surface.

Auction Seating.—Accessibility to seating is important because it allows use of the full seating capacity.

More than one entrance should be provided and aisles should be clearly marked and used only for movement to and from the seats. Better access can be obtained by the use of a staircase leading to an aisle behind the top row of seats, as well as the usual ring side aisle. The top aisle can be used for horizontal movement with less distraction of seated spectators. Before designing a seating arrangement, local building codes and ordinances should be consulted as they may be the deciding factor for minimum individual requirements. In most localities a capacity of 200 to 250 seats is adequate.
Figure 65.—Comfortable auction ring seating.

In existing markets where the main entrance is directly in front of the auction booth, a visual barrier can be placed on the ring fence to alleviate the congestion caused by patrons standing in the entrance. This is important where this entrance is the only access to the seating area.

Most auctions have wood or concrete step-type seats. The spectator sits on the front of one tread with his feet on the back of the tread directly below his seat. The front part of this lower tread is also the seat for the next row. It should be at least 30 inches wide to allow a walk space between the two. If the tread width does not provide space for lateral movement between seats and aisles, access becomes difficult and not all of the available seats are utilized. A 2 x 12 inch plank raised on 2-inch blocks and secured to the front part of the tread is recommended for the seat portion.

Auctioneer’s Booth.—The auctioneer’s booth or box is an important part of the sales ring. It must be of suitable height to allow mutual vision of buyers and auctioneer from any seat in the arena.

Most booths are designed to accommodate a ring clerk, weighmaster, and sometimes the starter—in addition to the auctioneer. When the scale is adjacent to the ring, the weighbeam or dial should be located in the booth so that the weighmaster can be observed from any seat in the arena.

The booth should extend about 3 feet into the ring in the middle and taper or curve back on each side. The floor of the booth should be a minimum of 3 feet above the ring floor. A shelf or counter top should be provided for clerical work. The box is also part of the enclosure for the ring and should provide adequate protection for the employees, yet have no protruding structural members that will injure the animals.

Many markets prefer to use two public address systems, one for the “selling” and the other for after-sale “yarding.”

Provisions should also be made for any electrical indicators that are operated from the booth such as weight readout banks, scale dials and information signs.

Arena Lighting.—The intensity and location of the lights should provide good visibility for both the patrons and the auctioneer. Lights should not cause glare for either the audience or auctioneer. Light fixtures should be kept clean to obtain the maximum lighting.

The most intense lighting should be focused on the ring and designed to prevent shadows. The lighting in the remainder of the arena should be sufficient to allow the auctioneer to see any bidders.

The area just outside the ring gates should be well lighted as animals do not enter darkened areas easily.

Figure 66.—Detail of auction seating.
It is recommended that no windows be placed behind the seats as it impairs the auctioneers vision. Where such windows are now in existence, the glare should be eliminated. Mechanical ventilation should be provided in the arena.

**Market Offices.**—Offices should be of adequate size, clean, well lighted and temperature controlled where necessary. A separate private office should be provided for confidential business. To avoid heating or cooling the main arena on other than sale days the office should be heated and air conditioned separately. A separate restroom should also be provided for office employees.

Several electrical outlets should be provided for office machines. Pay telephones for the public are desirable to eliminate interference with office telephones.

Some type of counter or partition with bank-type windows should be provided. This arrangement has the advantage of keeping unauthorized persons out of the office proper during the sale. The “buyer” and “seller” windows, when needed, should be separated and enough space provided at each to write checks or perform other similar functions. They should not be located where people waiting to be served will block the movement of others.

A separate area should be provided for truck parking. The area should be close to the truck docks, yet should not interfere with the dock approaches.

Access to and from the parking area and truck chutes is essential. Painted lines or similar control markings can be used for individual stalls and lanes. This will help keep the dock area and approaches clear. Where the parking area is limited, an attendant should be provided to control parking in order to park the maximum number of vehicles in the minimum area. This will also allow individuals that might otherwise be blocked by random parking to leave before the end of the sale.

At terminal markets, a separate parking area should be provided near the Exchange Building for out-of-town patrons. Separate parking should be provided for those working at the market.

**RESTAURANT**

All markets should provide eating facilities for the patrons unless adequate accommodations are available in the area. Since most of these facilities are dependent upon market customers or employees for patronage, the size, kind and number of days of operation will vary with the market.

Before the market undertakes to provide elaborate restaurant facilities, it should make sure there is sufficient business to justify the investment in space and equipment. Few markets can economically afford an elaborate eating place.

Stand-up snack bars will provide adequate eating facilities at smaller markets and those that do not hold sales during normal meal hours. However, even the smallest snack bar should be well lighted, protected from flies, and designed for ease in cleaning. It should be kept clean at all times.

Before planning and construction starts, the local laws governing public eating places should be consulted.

**RESTROOMS**

Modern restrooms should be provided by the market. Where city sewers are not available, septic tanks should be used. These facilities should be kept clean and sanitary.

At terminal markets, a toilet should be provided at each scale house.
OVERHEAD WALKWAYS

Overhead walkways, also known as footwalks or catwalks, provide easy, clean and safe passage-way over the pens. They provide an unobstructed view of the animals in the adjacent pens. Spectators, customers and employees using these walkways do not interfere with the movement of animals. Supervisory employees may use the walk to observe and direct yard work. A staircase to ground level should be provided at various points so that the walkway can be used for access throughout the yard.

Figure 68.—View into pens from overhead walkways.

Construction of overhead walkways should be integrated with the fence lines and structural supports of buildings wherever possible to prevent unnecessary pen obstructions that cause bruising of livestock. Minimum clearances under the walkway must be maintained to allow free movement for mechanical equipment as well as animals and mounted riders.

Overhead walkways that are built over the back fence lines are less prone to damage from mechanical cleaning equipment.

Single post overhead walkways require a professional design, but all posts can be placed more easily in the fence lines.
All types of overhead walkways should have hand rails on each side as a safety measure.

Small containers, partially filled with sand and attached to the footwalk hand rail will serve as receptacles for discarded cigarettes and cigars. They will provide an effective aid to fire prevention.

Overhead walkways may be used to support electric and sound system wires as well as gas lines and yard lighting.

Fence top catwalks can be used for access between two alleys, but require steps at each end.

**VIADUCTS AND SUBWAYS**

It is sometimes necessary to construct viaducts or subways to avoid interferences in the movement of livestock. They may also be used for the movement of animals over or under railroads, roadways or other obstacles. However, the cost is high and their construction is not recommended unless studies indicate they will effect worth-while economies in operation.

Sufficient ramps should be provided to allow access to the various parts of the yard. All ramps leading to subways or viaducts should be of stepped construction as described in “Truck Receiving” on page 5.
It is particularly important that dark areas of subways or viaducts be well lighted; livestock is reluctant to move from lighted to dark areas.

The following factors should be considered in designing overhead viaducts and subways:

1. The maximum load to be handled, including the impact load.
2. The minimum clearance necessary to permit the unobstructed movement of mechanized equipment.
3. The most economical materials which can be utilized—wood, concrete, steel, or a combination of these.
4. Type of fence and material to be used.
5. Type of roof structure (extend edge to protect side fences from weather) and material to be used.
6. Type of flooring surface and material to be used. (Consideration should be given to the durability, traction and the cost of replacement. If floor is waterproof it will help protect the understructure from damage by water.)
7. Adequate drainage so they may be flushed for cleaning and drained of storm water.
8. Any other use to which the viaduct can be put such as support for electric lines, gas lines, yard lighting, or sound paging systems.
9. Uses for the covered area under the viaduct such as storage or office space.

UTILITIES

Water.—An adequate supply of water, suitable for both human and livestock consumption, should be readily available in the pen areas and structures at all times.

Water lines of sufficient size to maintain adequate volume are necessary. Mains should be at least 4 inches in diameter. Feeder lines should be 1½ to 2 inches with 1-inch and ¾-inch service lines leading to the individual hydrants.

Lines 4 inches and over may be steel, cast iron or asbestos cement. If asbestos cement is used, it must be carefully installed according to directions. It is easily damaged by improper bedding and backfilling. The smaller lines—2 inches or less—may be copper, galvanized steel or plastic. The copper pipe is recommended for long life, which justifies the original higher cost. This is especially true when it is laid under pavement where replacement cost would be high. Plastic is recommended for low pressure and temporary systems. Plastic pipe should be chosen carefully. There are many types on the market and some are not suitable for the higher pressure and water hammer effects of hydrant type valves. Where soil conditions do not cause rapid corrosion, the use of galvanized steel pipe may be economical. However, it is not recommended for installation under paving or structures.

Automatic waterers materially reduce the required size of water lines needed.

Many large yards have found it advisable to install an independent water distribution system for fire protection. Such systems should be directly connected with the city mains where possible. This type of connection normally gives better pressure and volume of water.

Where the water pressure is inadequate for flushing pens, the use of a portable motor driven pump unit will provide the necessary additional pressure. This same unit can be equipped to serve as auxiliary fire fighting equipment, or for cleaning and flushing clogged pipes.

A sufficient number of valves should be used in the network of water pipes so that feeder lines may be isolated for repairs. These valves as well as those located at the various hydrants should be protected against freezing. Underground systems with frost-free valves are recommended. All control valves should be closed and opened at least every month. This monthly exercising should be done during periods of high water usage so the large flows will wash the rust and sediment out of the valve seats. If these valves are regularly exercised, they will be much more likely to close tightly when needed.

Hog and cattle pens should be provided with a sprinkler system for use in hot weather. When fixed overhead systems are used, the network should be designed so that individual lines can be shut off when not in use and the entire system can be drained in cold weather. Many yards use perforated hose instead of pipes. This is satisfactory, but requires more frequent replacement.

Sewers.—Sewers or drains should be designed, located and constructed with sufficient size and grade to carry the runoff from rain (based on local rainfall tables) and manure where the yard is cleaned by flushing. The minimum size of the sewer pipe from trough and pen drains should be 6 inches. Sewer laterals should be 8 inches in diameter. A minimum grade of 5 inches per 100
feet is recommended to provide self-cleaning velocities. In those yards where topography of the land does not permit adequate natural fall, sewer pumping stations will be necessary. A manhole or clean-out box should be included in the sewer line at 300 feet intervals and at points where there is a horizontal or vertical change in direction.

Some yards are required by State or local health laws to maintain separate sanitary and storm sewer systems. The sanitary system is usually connected to the local city sewer system or a septic tank. Local laws should be examined before making any plans.

Heavier-than-water materials such as sand, gravel or ashes should not be used for improving traction during icy or wet conditions as they will clog sewers. Sawdust, powdered limestone or other similar locally available materials are recommended.

Open drains located in the rear of the pens are satisfactory, although their use requires additional area and fences. All such drains must have a fence on each side except where they are located on the perimeter of the pen area. Their advantages is the ease with which the pen area can be flushed and the drain cleaned. Freezing and clogging are the principal disadvantages. Clogging can be eliminated and freezing minimized by proper design and construction. Open drains should have a top width of from 12 to 18 inches and a semicircular bottom from 6 to 8 inches in diameter. The grade or fall should be from 6 to 8 inches per 100 linear feet. All outlets that empty into a sewer should be equipped with grates to prevent large solids from entering the sewer. The semicircular bottom is important in increasing efficiency and reducing cleaning. Either formed concrete or half tile can be used.

Underground drainage systems are expensive to install but are less expensive than the continual cost of cleaning and maintaining poorly drained areas. This is true of the parking area and truck chute approaches as well as the alley and pen areas. All markets should be designed to take advantage of natural drainage.

Clean facilities enable the market to show the animals to their best advantage. Proper drainage is a major factor in yard cleanliness.

Sewers can be satisfactorily constructed of vitrified clay pipe, asbestos cement pipe, concrete pipe, and cast iron. Vitrified clay pipe is the most used material for stockyard sewer construction. It is economical and long lasting. The chief disadvantage is the separation of the joints. This allows ground water infiltration and allows roots to enter and grow. Asbestos cement pipe is light and easily handled, reasonably priced, impervious to most corrosive materials and the joints seal tightly. However, it breaks easily and must be laid carefully. Concrete pipe is economical and lays easily. It is affected more readily by chemical action and does not last as long as vitrified clay pipe where chemicals are present. It is also subject to the same joint problems. Cast iron pipe is more expensive, but is durable and the joints seal tightly. Most local building codes require its use for all sewer systems within a building. However, it is usually too expensive for extensive underground usage. Manholes can be constructed of brick but are more economically built of precast concrete sections.

State and Federal requirements for sewage disposal are becoming more restrictive. Proper authorities should be consulted before any new facilities are constructed.

The stop and waste freeze-proof valve may be placed in the same manhole that is used to drain the pen area. If this is done, the outlet of the sewer should be near the top of the manhole to provide a water cover for the valve.

Electricity.—Adequate lighting for operations at night and on cloudy days is essential to the efficient operation of any stockyard. Particular attention should be given to the lighting at the unloading and loading docks, offices, sales arena, and sorting areas. Some yards lease part of their lighting needs from the local electric company. It will furnish lights which provide good illumination and their cost usually includes servicing.

All yard lights should be mounted high enough to give proper light dispersion without glare. Minimum pole height should be 30 feet above the ground for the type lights used in the newer municipal street lighting systems.

Many stockyards use portable electric tools for maintenance and construction. Unless portable generators are used, outlets must be provided throughout the yard. When outlets are available, they can be used for other duties such as emergency night lighting.

If electrically-heated water troughs are used, an electric distribution system designed to carry the heavy load should be built as part of the installation.
Any system of overhead wires should be built with sufficient clearance to permit the unobstructed movement of mechanized equipment.

Heat.—When sources of heat are needed, natural or bottled gas as well as fuel oil and electricity should be considered. Any one, or a combination, may prove the most economical for the various places in a stockyard which require heat.

CONSTRUCTION MATERIALS

Stockyard facilities should be constructed to provide for the safety of patrons and employees as well as safekeeping and handling of livestock without injury or loss. They should be readily maintained and repaired. Fences, gates, gate hardware, troughs, mangers, and other pen appurtenances should, whenever possible, be standardized as to sizes, types, shapes, heights, lengths, and construction details. Construction materials should be selected for long life with minimum maintenance.

Following are the most commonly used construction materials at public stockyards:

Wood.—Lumber will continue to be one of the major structural materials used for yard construction. Its many good points include an available supply, ease of shaping and placing, strength, flexibility, and adaptability. Lack of durability, loss of strength from exposure to weather, and fire hazards are the principal disadvantages.

Some softwoods, such as yellow pines, Douglas-fir and cypress, are well suited for open pens or exposed construction. The pines and firs are the woods most generally pressure treated with wood preservatives. However, black locust and oak are the hardwoods that make good fence and post lumber without treatment where they are economically available and are protected from the weather. Their strength and toughness are an important consideration. Locust posts, however, are seldom straight and they are difficult to nail.

Cedar fence posts give excellent service but the supply is limited.

Creosoted pine lumber and fence posts are readily available at moderate costs and give many years of satisfactory service.

Concrete.—Concrete is used primarily for pen paving material and has been used successfully as such in all parts of the United States. Paving of the proper thickness, well scored, gives many years of highly satisfactory service, is easily cleaned and disinfected and requires very little maintenance.

The concrete should be scored at all locations where slippage could be a problem. Inexpensive grids for scoring can be made from reinforcing bars or angle irons welded together. When angle irons are used, the angle should be placed on the bottom side so that the impression will be widest at the surface. The grid should be of sufficient size to cover several square feet but not too heavy and awkward for a small crew to handle. Broom finishes for concrete are not recommended because the finish wears smooth in a short time.

Concrete is also used for structural members of buildings over stockyard pens, and for office buildings. It is highly satisfactory and provides a long, durable life.

Figure 75.—Scored concrete alley.
Precast concrete sections used for overhead walkways and viaducts give long maintenance free life but require professional designing and exacting construction techniques to be successfully used.

Prestressed concrete members have been used successfully for component parts of structures used to house auction arenas as well as for the seating and roof members.

Various air entraining additives, are available in concrete today. These add greatly to the concrete's workability and materially prolong its life when used in climates where freezing and thawing cycles occur. These additives enable concrete to be worked at a lower moisture content. The use of mechanical vibration equipment, available in a variety of styles and types, adds greatly to the ease of placement and the structural strength of the concrete. Vibration is particularly advantageous when the concrete is used for paving or outside exposed areas as it creates a dense waterproof surface. The vibration eliminates voids and imparts a more uniform strength to all concrete being poured.

Various materials containing carborundum are available to add to the surface of the concrete as it is poured. These materials may also be used as a surface treatment for worn concrete now in place. Their suitability for yard pavement is questionable. They may be helpful in preventing slippage on pedestrian walkways. When used over old concrete the surface must be very carefully prepared for a successful bond.

Brick.—Paving brick is used for stockyard paving by many of the older markets. It is a durable paving material. Some of the yards are still using brick paving laid more than 75 years ago. However, it does not maintain an even surface under today's heavier mechanical equipment. Most of the bricks were laid on a sand base and have no supporting pavement under them. The surface also becomes slippery when wet. The areas around each brick hold enough dirt and manure to make disinfecting difficult. The labor required to lay brick makes it too expensive to compete with concrete or asphaltic pavement at today's labor prices, except under special conditions.

Asphaltic Concrete Mixes.—Asphaltic concrete mixes make good paving material if laid over a supporting base such as old concrete or brick pavement. The specifications used by local State Highway Departments are excellent guides to follow. Care should be taken to leave the surface sealed but rough. This will help prevent slippage of livestock when the surface is wet. When old pavement is covered with asphaltic concrete mix, care must be taken to make sure the surface is very clean, free from dust and moisture, and that a proper tack coat is used.

Special asphaltic concrete mixes can be used to cover worn wooden viaducts if the proper mix is used and care is taken to properly prepare the surface.

The length of service obtained from asphaltic concrete mixes will be improved by compacting properly and treating the surface to maintain its resistance to penetration by moisture.

Parking lots may be successfully surfaced with highway mixes if the subsoil is compacted and proper drainage is established.

Roofing.—A number of roofing materials are suitable for stockyard usage. They include tile, slate, asbestos cement, asphalt, metal, wood, tar, and roofing felt.

A built-up or composition roof consists of several plies of roofing felt cemented together with coatings of hot tar. Sometimes, a layer of insulating material is placed under the roofing material. The entire covering of felt may be given a heavy finish coat of tar and covered with gravel. Some roofs omit gravel. Instead, the finish consists of a thorough coat of tar.

Roofs of low pitch must be covered with some form of built-up roofing, while other roofing materials may be used where there is sufficient slope.

Slate and tile make excellent long lasting roofs but the initial cost of materials and labor is high. Asbestos or asphalt shingles are economical and give good service. Asphalt rolled roofing is economical and gives fair service. Normally it will not give the length of service of the other materials discussed.

Various types of metal roofs are widely used for market structures because of the comparatively low cost and ease of construction. They are light and durable, but have poor insulating qualities. Steel can best be protected from rusting by hot-dip galvanizing. For existing steel roofs that show signs of rusting, rust inhibiting paints or tars may be used to protect the metal. Corrugated metal roofs do not require sheathing for support.

Aluminum does not require painting but, under certain conditions, is subject to deterioration from corrosion. It is lightweight and tends to retain
its high reflective luster. Rolled aluminum roofing can also be economically used for re-roofing over an old roof. Both aluminum and steel are fire-resistant.

Highly reflective roofing lowers the temperature under the roof.

A regular program of inspection and repair should be followed with any type roof. Roof leakage will cause structural deterioration that will far exceed the cost of maintaining the roof.

**General Metals.**—Aluminum, steel and magnesium are being used as substitutes for wood in gates, mangers, troughs, fences, posts and structures.

The danger of livestock freezing their tongues or noses to metal mangers or troughs during severely cold weather has been carefully investigated over a wide area having normal winter temperatures ranging far below zero. Not a single instance of such freezing could be found and there is little evidence that this so-called danger actually exists.

**Aluminum.**—Aluminum offers lightweight, high strength, ease of fabrication, and durability under ordinary conditions of exposure. It is fire resistant but corrodes rapidly when in contact with certain alkaline and acid soils or exposed to air carrying acid fumes and smoke from industrial plants. It should not be used in places under conditions favorable to its rapid corrosion; therefore, its suitability for fence posts depends on local conditions. Generally it is not recommended for this use.

A number of gates constructed of shaped sheet aluminum have been installed and used under practically all stockyard service conditions and their use has not proved satisfactory at most yards.

The most successful aluminum gate is an alloy of aluminum and magnesium and constructed of welded tubular sections. These gates are extremely rigid, lightweight, and present a pleasing appearance. However, they are rather easily damaged by protruding parts of mechanical cleaning equipment and are expensive to repair because of the specialized heliarc welding equipment involved. These gates have proved particularly successful when used as scale gates or gates to chutes where high frequency of use is involved and their light weight makes them advantageous. They are generally considered too expensive to use for all pen gates.

**Magnesium.**—Magnesium combines strength with very light weight. In its pure form, it is rather difficult to work, is costly, and is subject to damage or destruction by fire. However, it is used very successfully in its alloyed form, particularly in connection with aluminum, as it then loses most of its undesirable properties and adds materially to the strength of the aluminum.

**Steel.**—Steel offers high strength, ease of fabrication, durability under many conditions and full resistance to fire. Its weight and low resistance to corrosion are its principal disadvantages.

Steel is used in many forms for pen fences rather successfully. It is used as woven and link mesh fencing successfully as long as it is contained rigidly at both ends and top and bottom. This usually is accomplished by welding or wiring it securely to a steel post and framework system.

Steel pipe, both new and used, is being used for gates, fences and structures. Various structural shapes manufactured for a specific purpose, such as those for barn door tracks, have been utilized for fence rails and posts. They are expensive and the corrosion factor is high unless they are painted or properly protected.

The successful use of steel for all stockyard uses is dependent on adequate protection from the many corrosive factors present in a stockyard.

Used oil well pipe, one of the most frequently used steel structural materials—especially in the southwestern part of the United States—is proving to be troublesome because of a high degree of rust and corrosion, particularly at ground level. Its use requires adequate forethought before construction and preventative measures during construction as mentioned earlier. The part of the pipe located above the ground also requires frequent and thorough painting to prevent an accumulation of rust.

Metal buildings are available from several manufacturers and provide good stockyard structures, although they must be adequately protected from rust and corrosion. Steel structural members rust rapidly because of corrosive dust and moisture that are always present within a stockyard. Ease and speed of erection are advantages of these types of buildings.

Sheet metal water troughs similar to that in Figure No. 34, constructed of 16-gauge or heavier material, present a neat appearance and are easily moved from one pen to another if alterations are
required. However, they must be heavily galvanized to prevent rusting and corrosion. Painted sheet metal troughs have not proved satisfactory as they must be painted every few months to prevent rust.

Aluminum and steel make excellent siding and roofs for frame buildings over stockyard pen structures. Adequate protection must be given to the side walls up to a height of five feet to prevent damages from both animals and equipment.

Preservatives.—Present-day lumber is often immature sap wood, cut from second growth and subject to rapid decay. Good wood preservatives, properly applied with standard retentions and with the wood satisfactorily penetrated, substantially increase the life of wood structures—often as much as five times. Pressure treatment is necessary to secure adequate penetration.

Wood preservatives fall into two general classes: oils, such as creosote and petroleum solutions of pentachlorophenol; and water borne salts that are applied as water solutions.

Preservative oils generally have high resistance to leaching and are suitable for outdoor exposure. They do not cause the wood to swell, but some shrinkage may result if a loss of moisture occurs in the wood during the treating process.

Creosote and solutions with the heavier, less volatile petroleum oils help protect the wood from weathering but may adversely influence its cleanliness, odor, color, paintability, and combustibility.

Coal-tar creosote is the most important and most generally used wood preservative for stockyard usage. Its advantages are: (1) its high toxicity to wood-destroying organisms; (2) its relative insolubility in water and its low volatility, with a greater degree of permanence under the most varied conditions; (3) its ease of application; (4) the ease with which its depth of penetration can be controlled; (5) its general availability and relatively low cost; and (6) its long record of satisfactory use.

Although, as yet, there is no better preservative than coal-tar creosote, it has certain disadvantages for certain special purposes. Freshly creosoted timber can be ignited easily and will burn readily, producing a dense smoke. However, untreated wood that has started to decay is easier to ignite than timber that has been kept sound by creosote treatment. Contact with the fresh oils will result in burns to livestock and people. The fumes will sometimes burn the skin of the face and hands. The odor is unpleasant and irritating. However, seasoning alleviates most of these disadvantages. Open storage in sunlight before use is recommended.

Pentachlorophenol has a high degree of protection against decay, fungi and termites when wood is properly pressure treated under standard specifications. It does not appreciably alter the natural color of the wood and has little surface residue. The performance of this preservative is influenced by the character of the petroleum oil in the treating solution.

Other oil borne solutions are available but the above are the most commonly used. Standard wood preservatives used in water solutions include zinc chloride, tanalith (Wolman Salts), acid copper chromate (Celcure), zinc meta arsenite, ammoniacal copper arsenite (Chemonite), chromated zinc arsenate (Boliden Salt), and chromated copper arsenate (Greensalt or Erdalith). These preservatives are employed principally in the treatment of wood for uses where it will not be in contact with the ground or water and where the painting of treated wood is desirable. As a general rule, they are less resistant to leaching and do not perform as satisfactorily as the preservative oils under conditions favorable to leaching. Waterborne preservatives are generally preferable to creosote for indoor use.

When it is necessary to cut treated wood, the damage can be minimized by thoroughly brushing the cut surface with the preservative.

All lumber used for gates, fence rails, and buckling boards should be treated when used in open pens. Treated lumber is also recommended for mangers, feed troughs, roof framing and trim in exposed areas, and those places where breakage is not the controlling factor. As with posts, all saw cuts and holes should be well painted with the same preservative.

For additional information on types, properties, and uses of wood see Agriculture Handbook No. 72, USDA’s “Wood Handbook,” available from the Superintendent of Documents, Washington, D.C. 20402, price $2.25.

USEFUL STOCKYARD EQUIPMENT

Mechanized equipment usually can be used to advantage by most stockyards. While the follow-
ing list of equipment will not be suitable for use at all markets, the market operator should not reject the use of any equipment until he has studied all of the possible economics of its use.

**Trucks.**—Small trucks of standard design are useful at most yards.

Three-wheel or "tricycle" trucks which are specially designed for sharp turns and ease of maneuvering through stockyard alleys are available. They may be equipped with flat beds for hay hauling or hydraulic dump bodies for manure. Truck bodies specially built for plumbers, electricians, and carpenters are sometimes mounted on jeeps. Cab-over-engine type trucks, with special large-capacity bodies, are used for hauling manure.

![Figure 76. Custom built tricycle truck used for hay hauling.](BN-29260)

![Figure 76. Custom built tricycle truck used for hay hauling.](BN-29261)

![Figure 77. Jeep converted into maintenance truck, with electric generator on front and lumber rack on top.](BN-29262)

![Figure 77. Jeep converted into maintenance truck, with electric generator on front and lumber rack on top.](BN-29263)

**Tractors and Trailers.**—Tractors of various sizes and types, both wheel- and track-type may be equipped with lifts, scoops, and forks, back hoes, bulldozer and scraper blades, and posthole diggers. Tractors and small four wheel drive vehicles can be used to pull trailers of various kinds and sizes, including the very low body styles used for handling crippled and dead animals.

![Figure 78. Custom built manure hauling truck.](BN-29264)

![Figure 78. Custom built manure hauling truck.](BN-29265)

![Figure 79. Jeep pulling auger-equipped feed trailer.](BN-29266)

![Figure 79. Jeep pulling auger-equipped feed trailer.](BN-29267)

**Manure Loaders.**—Wheel- and track-type tractors mounting manure loaders using a hydraulic system to operate scoops and forks are used for economical loading. Each piece of equipment has desirable features and particular uses. Careful study of individual market conditions will be necessary to determine the type of loader that is best suited to a particular yard. Size and weight determine the maneuverability and traction.
Power Sweepers.—Street sweepers, with or without catching bins, are used for cleaning alleys and viaducts. The sweepers with catch bins require frequent dumping. Various types of vacuum sweepers have been tried but to date have not been successful.

Fire Hose Nozzles.—Fire hose nozzles should be convertible to either a direct stream or low-pressure fog. Low-pressure fog is very effective in rapidly blanketing and extinguishing intense fires and the use of convertible nozzles is recommended to all stockyards. In addition, the low-pressure fog nozzle has proved very efficient in cleaning pens by flushing.

High-pressure fog systems are very efficient in controlling fires in buildings and closed structures, but their use in open pen areas is not recommended.

Large stockyards may find tower-mounted fire monitors to be an effective means of controlling the spread of fire. They may be rotated either automatically or manually.

Equipment Cleaning.—Portable steam cleaners are particularly useful for cleaning all types of mechanized stockyard equipment. Their use reduces maintenance and repairs, and clean equipment adds to the morale of employees.

Portable Generators.—Engine-driven portable generators are used to power portable hand tools used by maintenance employees. Their use materially reduces the cost of repairs and construction. They can also be used as emergency power sources for lights and pumps when needed.

Portable Welders.—Engine-driven portable welders, which may be used in the maintenance shop as well as taken into the pen areas for maintenance and construction work, are useful equipment. They may also be equipped for use as portable power generating equipment.

Hay Loaders and Lifts.—Power-driven hay loaders are useful for stacking hay. Heavy duty lifts, for handling large volumes of baled hay on pallets, are now used for moving hay from truck to stockpile, from stockpile to delivery trucks, and for direct delivery to the pens. Their use is proving profitable where large quantities of hay are stored and fed.

Grain Handlers.—Grain distributors, consisting of a "V" body trailer or truck beds equipped with a screw-feed or air blower, are used for delivering corn to storage bins in the hog division. Tractors or jeeps, equipped with a power takeoff, are used as motive power. They may also be mounted on the tricycle type tractor for further ease in handling.

Carts.—Scale test-weight carts are useful for transporting market-owned scale test weights. "Cripple" carts make possible quick and humane handling of crippled animals. These carts are especially useful at receiving docks.

Sewer Cleaning.—Heavy, flexible, power-driven sewer rods are very efficient for rodding and cleaning sewers.

Air Compressors.—Engine-driven portable air compressors can be used to power a variety of pneumatic tools which are available for maintenance and construction work.

Miscellaneous.—A power-driven endless belt operating in a narrow wooden or steel trough
makes an economical scale ticket carrier. The tickets are laid on the belt and fall off the other end. Unless the slope is steep no special clips or holding devices are needed. When a change in horizontal direction is desired, one belt may dump directly onto another.

A pneumatic tube system may be used where a belt system is not practical. Slappers, made from a wide canvas belt, are recommended for use with all types of livestock. They should have a solid handle about 12 inches long, with a belt at least 3 inches wide.

**FACILITIES FOR SERVICING EQUIPMENT**

Where the size of the stockyard justifies it, a well equipped and suitable shop should be provided for the maintenance and repair crews. The equipment should include electrically-powered stationary and portable hand tools, welding and metal working equipment, and suitable trucks for transporting tools and supplies. The storeroom and principal material storage facilities should be adjacent to the shop.

A heated garage or service building should be provided for the servicing, repairing, and housing of mechanized equipment. The facilities should include adequate provisions for washing and steam cleaning.

**SANITATION AND DISEASE PREVENTION**

The entire stockyard should be reasonably clean at all times. Hog pens should be washed after each use, and cattle and sheep pens should be cleaned on a regular schedule. At the larger yards, the cleaning should be done by regular cleaning crews using mechanized equipment. At smaller yards, and at those yards where one or two day peak runs create problems in labor distribution, the use of hand labor and motor vehicles may prove economical. Truck docks, catch pens, scale pens, and other pens where hay and bedding are not used should be cleaned by flushing, if possible. All mechanized equipment should be large enough for the needs, but oversized equipment should be avoided.

Testing and immunization facilities should comply with Federal and State regulations and requirements.

They should be located where they will minimize interference with livestock movement without causing excessive drives.

**FEED FOR LIVESTOCK**

Wholesome feed, of the kind and in the quantity ordered, should be supplied promptly. Delays in feeding and low quality feed often cause complaints by both the shipper and operators on the market.

Auxiliary feed storage at convenient places throughout the yard, the use of motorized equipment for delivery, and the streamlining of methods for receiving and filling feed orders are recommended. A number of terminal yards now provide temporary feed storage at each assignment of pens and make bulk deliveries of feed during the slack periods. Each market operator then distributes the feed according to his needs. The size and content of the auxiliary and temporary feed storage facilities must conform to the requirements of fire insurance underwriters.

**OFFICE EQUIPMENT AND RECORD KEEPING**

Every market should consider the advantages of mechanical office equipment such as adding machines, calculators, and accounting devices. The cost of this equipment should be evaluated in terms of efficiency, time, and accuracy. All markets are required to maintain certain records for sellers, buyers, and governmental agencies, as well as for their own information. If this can be done faster, cheaper, and more accurately by office machinery, the cost is justified.
The system of maintaining records or accounting is also an important factor. The use of special forms designed to speed up the operation, cut down on the manpower required, and still show the desired information often justify the cost. The new N.C.R. (no carbon required) forms are gaining widespread acceptance, especially for accounts of sale. For example, many stockyards start this form at the unloading dock, removing a copy to serve as a receipt for the consignor; the form then goes to the office where the remainder of the information is filled in after the livestock is sold. This process eliminates many errors caused by copying information from one form to another and saves manpower.

Automatic data processing equipment is being successfully used at a few auction markets and at least one terminal market. Larger markets would do well to investigate its feasibility for their operation.

Machines used in banking should also receive due consideration.

The amount and kind of equipment needed will vary with each market but few can operate efficiently without an adding machine and a calculator.

Do not make the mistake of adding forms and machines to record keeping without first justifying the cost. Make sure the new records serve some useful need. They also should replace old records and methods, if possible, so a duplication does not occur. With a detailed study, possibly by professional advisors, good records need not be expensive. They are, however, an absolute necessity from which business management must make its decisions.

Forms provided and records kept by the stockyard company should be sufficient for the needs of not only the market but also of the consignor, buyer, and the various governmental agencies. Their use will result in the proper identification, handling, selling, weighing, and accounting for the livestock received. They should also provide a detailed list of the various marketing charges. All feed should be carried on an inventory basis and full cost figures should be maintained.

Records of receipts, shipments, and the movement of livestock through the market should give sufficient detail to enable the market to check on the efficiency of its present operating methods. Most markets will wish to establish the point of origin of all livestock received. This establishes the weak points in their trade territory so that corrective action may be taken.

At terminal markets, continuing daily records of scale performance should be kept. These should include opening and closing time, hourly record of number of drafts weighed, and number of head handled. The time and cause of any delays should be noted.

Records of the number of trucks, number of consignments, number of head of each species, and hour and day of arrival should be kept for selected periods of normal high receipts to establish the use and efficiency of the unloading operation. This information will also provide the basis for any new additions to the unloading facilities.

**Publication of Charges, Facilities Furnished, and Services Rendered**

It is suggested that stockyard companies clearly state and define the services and facilities furnished for the “yardage” charge it will make. Section 201.17 of the regulations issued under the Packers and Stockyards Act provides: “The term ‘yardage’ shall be used in schedule of rates and charges * * * to describe the basic stockyard facilities and service furnished and shall, unless otherwise indicated therein, include: The use of suitable facilities for the safe and expeditious receiving, handling, feeding, watering, holding, sorting, selling, buying, weighing, delivery, and shipment of livestock; the services necessary and incident to the receiving of livestock at the place of unloading; the furnishing of receipts for livestock to the carrier or consignor; the delivery of livestock to the consignee; the obtaining of receipts evidencing delivery of livestock to the sales pens assigned to the consignee; the furnishing of sufficient potable water for livestock; the initial weighing of livestock when sold and delivered to scales; the issuance of scale tickets showing actual weight and other pertinent information concerning the livestock weighed; the removal of livestock from scale after weighing and delivery to holding pens; the holding of livestock for a reasonable time pending delivery or shipment to buyers; the delivery of livestock to buyers; and the obtaining of receipts for livestock delivered to buyers.” (Italic added.)

This is interpreted to mean that the services in-
cluded in the above definition are considered to be the function of the stockyard company. At some markets however, not all of these services are necessary or, it is more practical and economical to have them performed by others. When such is the case, an exception must be provided in the tariff or, a definition which will include only those services and facilities which are furnished should be set out. Specific services in addition to those included in the definition of yardage or exceptions to the basic yardage charge should be clearly defined. Particularly those services not intended to be included in the basic yardage charge and for which a separate charge is made should be carefully itemized.

The entire published tariff should explain to the shipper and other users of the market the services and facilities available, the charges for their use, and the rules and regulations governing such use. Properly prepared tariffs should reduce unjust criticism, increase good will, and provide worthwhile advertising for the stockyards.

SUGGESTIONS FOR BUILDING GOOD WILL

In addition to providing the essential services and facilities, the stockyard companies can provide a number of facilities and services that will improve their relationship with the patron, improve the morale of the operating personnel, and increase the efficiency of operations. The worth of these auxiliary services and facilities should not be overlooked.

The yards should have parking areas for patrons close to the main building, and provide other convenient parking for the employees and operators on the market.

Overhead footwalks are appreciated by the patrons and are time-savers to both the company employees and operators on the market.

Public address systems for paging in the yards are great time-savers. They are also very useful to direct yarding of the livestock sold at auctions.

Suitable rest rooms and waiting rooms, for both men and women, should be provided for the patrons. They should be well equipped and kept clean at all times. Toilets in the scale houses are very desirable at terminal markets.

Restaurants or cafes—operated under sanitary conditions—serving wholesome food at reasonable prices, are an asset to any yard. The lack of such facilities creates dissatisfaction among patrons, truckers, and company employees.

Pay telephones at convenient locations help create good will and cut down on the interference with office personnel by people wanting to make telephone calls.

Greeting regular consignors and buyers by name makes them feel welcome and should pay dividends in return business.

Good upkeep of facilities and clean housekeeping will promote good will as well as reduce operating costs.

At terminal markets where more than one inbound dock is provided, signs should be erected to indicate which dock a trucker should go to for the particular species and commission firm to which his load is consigned.

Directional signs located along the street and highway routes will assist buyers and sellers in locating the market.

Terminal markets should provide signs in alleys designating the names of commission firms, order buyers, and dealers for the convenience of the patrons.