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There are many considerations when designing a new barn or renovating an older one, such as providing non-slip flooring and plenty of ventilation and light.

Thanks to Blackburn Architects for the use of this photo.

55 TIPS FOR BETTER BARNFUNCTION

Three experts explain how to make your barn more efficient and a safer place for your horse.

By Sally Silverman

The design of a barn impacts both the time and the money you spend to keep your dressage horse happy and healthy. Whether you're building or redoing a small, private set up or a large professional training operation, the following tips will help you create a better dynamic.

Building Placement

Situating a barn well affects what it's like to work in that building. The experts advise avoiding low-lying areas or those at the bottom of a hill, for example, because runoff from rain and snow will be a problem. Build downwind of any residential buildings to minimize the flies and odors. Orient the barn so it takes advantage of winter sun, avoids the hottest summer sun and catches summer winds for ventilation. Dennis Rusch, product manager for Morton Buildings, says that the location of roads, including service roads, should also be considered.

Architect John Blackburn advises choosing a builder who is experienced with equestrian facilities and is thus in tune with equine requirements, such as barn materials and safety issues. "A good barn shouldn't cost you an arm and a leg, but a poorly designed barn might cost you your horse." He begins by asking clients to complete a lengthy questionnaire before a design even gets started. He wants to know how his clients spend their time in the barn.

Eileen F. Wheeler, author of *Horse Stable and Riding Arena Design*, agrees that thinking about where activities occur is an important first step. "I encourage people to create a diagram that outlines where they spend their time," she says. "That's where they should try to streamline. For example, most of us spend less time cleaning tack than feeding, so it makes sense to make feeding convenience a higher priority than the tack room."

Convenience and Storage

Well-planned storage can save time and supplies. Keeping feed, hay and bedding in the middle of the barn, especially in a large barn, means less travel distance. Blackburn likes to put all of the service areas—feed room, office, tack room, wash stall—in the middle in large barns (16 stalls or more). "We can close that area off with sliding doors and heat it, making it more comfortable for the workers."

With hay storage in particular, Wheeler warns against creating a system that makes you a victim of what she calls "the refrigerator concept"—what's in the back of the refrigerator never gets used and what's in the front does. By creating a storage area that opens both to the outside of the barn for stocking and to the inside for removing, there will be a constant rotation of hay. While it's quite convenient to store hay in a loft and drop it into the aisle, it is not only a fire hazard but adds to the barn's dust and allergen levels.

Blackburn explains that if machinery is kept contiguous to the barn, it must be separated by a fire-rated wall.

Thinking ahead to everything you need in your barn and identifying a place for it will mean less clutter, which is a safety hazard. You will also save time if you don't have to hunt for items.

Ventilation

The experts agree that ventilation is probably the single most important consideration, but many times it is overlooked. "Fancy barns that are beautiful but, when the windows and doors are closed, there is no fresh air," says Wheeler, adding that horses have dusty bedding, urinate and defecate on the floor and have more need for fresh air in a barn than people do in their bedrooms.

Blackburn reminds us that horses in a barn can't respond to their natural instincts to get warm or cool off. With forethought, a barn can be built for good, natural ventilation.

Wind moves most of the air in a stable, so every barn needs a minimum of two sets of openings throughout the horse-occupied area to allow air to enter and exit. For example, there can be openings or vents along the eaves (where the walls meet the roof) and along the ridgeline (highest part of the roof). During cold weather, the warmer, stale air inside rises and escapes through the upper openings.

Rusch tries to impress upon equestrian customers the need to think of ventilating for their horse's comfort, not their own. "We recommend Dutch doors or windows on the outside wall," he says. "Fans in the cupola on the ridgeline of the building pull out stale, moist air and pull in fresh air through the overhang or the windows." Multiple openings are needed for efficiency.

Courtesy Blackburn Architects

Select single-hand-operation hardware, so you can lead a horse or carry a bucket with the other hand.

Stalls

Rusch says the most common stall is 12 feet square. "You want enough room for the horse to move around and get up and down comfortably. If you super-size that space, you have increased maintenance, a need for more bedding and a bigger area to clean."

Partitions between stalls should be at least eight feet high to prevent a horse from getting a hoof over it, but they don't necessarily have to be solid from top to bottom. Spaces of an inch or so between wooden boards will enhance ventilation, as will a barred or mesh portion on the top. This configuration also has the benefit of allowing horses, which are herd animals, to see their companions and provides easy observation of the horses by their humans. For the same reason, doors that are open on top or an open door with a stall guard or safety gate will increase visibility, light and ventilation. Bars, however, must not be more than two to three inches apart, and openings in heavy gauge wire mesh should not be more than two inches to prevent a hoof from getting caught.

Blackburn built a barn for one client who does a lot of breeding and, at her request, he created all-steel mesh fronts for the stalls. "She is able to look down the aisle and see if a horse is up or down. It's good for ventilation, too," he says. The drawback is that bedding is kicked into the aisles, for which Blackburn installed bedding guards. He says that doors should be wide enough for a wheelbarrow to pass in and out—at least 4 feet. There are many reasons to use sliding doors over swinging doors. For example, a sliding door doesn't need to be closed when you take a horse out. A swinging door interferes with aisle space and can get caught in the wind, causing a hazard. If you must use them, install them to swing outward. If a horse is down against a door that swings in, you've got a problem.

Blackburn always rounds or angles all edges in the stall for safety and includes a casting rail—either a groove in the wall or a 2-by-4-inch rail bolted low to the wall, so there is something for the horse to catch his foot on when rolling to avoid getting cast. "The height will depend on the amount of bedding you use but, for $50 or so, it is the simplest thing you can do."

Easy access to feed buckets is the quickest and most efficient way to feed to avoid opening and closing stall doors. Morton, for example, offers a swing-out panel with a feed tub in the bottom and hayrack in the top or two separate swing-outs. Both lock open and shut to avoid being tampered with by bored lips. While swing-out hay racks are easy to fill, some people prefer feeding hay on the ground as it is more natural for the horse and avoids the dust from hay in hay mangers placed on a wall.

If you are debating about getting an automatic waterer, Wheeler says that they have the advantage of offering fresh water at all times. One model comes with a meter, so you know how much water your horse is drinking. Some models also have a shut-off mechanism, which allows you to control water intake. If you go that route, be sure to choose a model that is easy to clean.

If you don't want automatic waterers, install water hydrants between every couple of stalls and provide for ample drainage for drips and overflows. Don't forget to frost-proof them in climates where pipes are apt to freeze.

In the feed room, wooden bins lined with metal are one way that Blackburn assures feed will be safe from rodents. He will often fashion a large closet of the same material to store excess feed. Whether using trash cans or custom-built bins, elevating them off the ground will make scooping easier.

Another option Rusch uses for large barns is to create a storage bin outside with an auger that opens into the feed room for the delivery of grain. Include space in your feed room for a refrigerator to keep medicines.

The wash stall is a convenience with the potential of becoming a real headache. Always install a drain from which clogs can be removed easily, and put a removable strainer in the drain. Position the hose overhead. Fasten it with an apparatus specifically designed for that purpose. It will be easier to use on the horse and eliminate the possibility of tripping or a hoof tearing the hose.

Blackburn likes to include a recess for a muck bucket and a way out of the back in case a horse gets ornery. For a grooming stall, recesses keep necessary tools nearby while keeping the environment safe. Consider a niche built for your horse vacuum or a built-in vacuum that connects to an internal unit, much like a house vacuum system. A collapsible saddle rack and hook in or near the wash stall and grooming stall can be handy.

Waste Management

When cleaning out stalls, the person pushing a wheelbarrow full of manure will appreciate a straight shot to the manure pile. In larger facilities, aisles should be large enough for pickup truck or tractor to pass through when deliver-

ing grain or hay or clearing manure.

The average horse creates four to five tons of manure per year. Combine that with soiled bedding material and about 12 tons will be removed annually from a horse's stall, says Wheeler. "I am somewhat disheartened when I see people build big, beautiful barns, but when they get the first load of manure, they don't know where to put it." Make it as easy as you can to get the manure out of the stall and to the manure pile. Mechanized scrapers that run through a gutter can be great, says Wheeler. But they are expensive, and any time you add something mechanical, you are introducing the opportunity for malfunction.

More typically, manure will be tossed into a cart or wheelbarrow and taken to a pile. Wheeler advocates a short-term pile near the barn and, if you don't have manure removed, a longer-term pile farther away. Taking advantage of elevation with a ramp from which manure can be dumped makes it easier, and you can drop it directly into a spreader.

Flooring

Choosing flooring is a matter of balancing what is wanted with what is affordable. Wheeler says that no stall flooring is perfect, so make sure you can live with any disadvantages. You want a surface that gives, is non-skid and durable, does not retain odor and is easy to clean. Mats in the stall offer the easiest clean-up option and can cut down on bedding requirements, but they can only be used on flat surfaces, such as wood, concrete, asphalt or leveled stone dust.

Blackburn likes popcorn asphalt. "The texture gives it some friction so it's not slick, and it is porous so it drains. If you choose to use it in the aisles, however, it will collect hay and bedding and such." If you use stone dust alone, it will hold urine and the ammonia gas will build up without proper ventilation. Blackburn says it's never good to use bare concrete floors around horses. "Concrete without rubber mats can become slippery," he adds, "and it is apt to freeze and crack in cold climates. The best flooring available is interlocking rubber brick because it is soft, recycled, durable, drains well and looks good."

Lighting and Hardware

Inside the barn, you want good lighting for ease of work and general good cheer. If the climate allows, skylights, transparent panels or openings on the upper sides of the walls can provide a lot of natural light. Blackburn puts lights on either side of the stall at least 10 feet high with a switch and an outlet at each stall. Good light not only makes cleaning easier, he says, but if the vet comes to care for a stall-bound horse, having a

Use recesses to accommodate items such as fire extinguishers.

well-lit environment is an advantage.

Wheeler advises that when selecting hardware, whether it is for inside the barn or on gates or fencing, a single-hand operation is always the best. You want latches that you can open or fasten with one hand while leading a horse or carrying a bucket with the other. They should also be durable enough to withstand the elements, horses leaning on them and years of use.

Safety

Fire is the greatest catastrophic threat to a barn. A few simple precautions can protect your barn and horses: Install a lightening rod; install enough outlets to avoid overloading; modernize your circuit breakers; don't store flammables (including hay and bedding) in the barn; protect wires with rodent-proof conduit metal or hard plastic; use recesses to accommodate items, such as fire extinguishers.

With function, efficiency and safety in mind, you can build a new barn or renovate an existing one that provides a better environment for your horse.

John Blackburn, AIA, is president of Blackburn Architects, P.C., a firm he founded in 1983. He holds a Master of Architecture and Urban Design degree from Washington University in St. Louis, Missouri. His firm specializes in equestrian architecture (blackburnarch.com). Dennis Rusch has been product manager of stabling and riding arena products with Morton Buildings for three decades (mortonbuildings.com). He grew up in a rural Minnesota community where the horses at his farm were used for work and pleasure. He lives in Morton, Illinois. Eileen F. Wheeler, earned a PhD in Agricultural and Biological Engineering from Cornell. Currently, she is an associate professor in the Dept. of Agricultural and Biological Engineering at Penn State. She is the author of the book Horse Stable and Riding Arena Design.