AEN-133

Cooperative Extension Service

**Farmstead Planning:** Old Farm Buildings Repurposed for Better Farming

# How to Develop a Farming Complex

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Farming is probably one of the most complex means of earning a living that has been devised. The many components of a farming operation that have to be managed would create an extensive list. Many beef cattle producers might focus on reproduction, nutrition, forages, health, and handling. However, there are many others operational considerations that are just as important.

Decades ago, college courses were taught on farmstead planning. These plans were engineering solutions to increase the efficiency of farming tasks. These courses would have addressed farm layout, family needs, land, buildings, power and machinery, livestock, and conveniences. Today, it is rare to find institutions that teach farmstead planning. If they did, they would have to address new categories, which may include technology, community, outside influences, and environmental regulations. The traditional farmstead planning process might have been ideal for farming operations set up on blank slate farms that were surveyed based on 640-acre sections. However, these concepts are more challenging for irregular shaped farms in Kentucky with existing structures built more than a half century ago. Older farm buildings may be underutilized because they were constructed using what would be considered obsolete technologies today.

Optimizing a farming operation offers a unique set of challenges that must be studied in great detail. Most producers are so engrossed in their operation that they do not have the time to step back and determine what problems need to be solved to achieve the greatest benefit. Many producers search for the silver bullet. However, a single practice that fits all farms does not exist. It takes time and effort to optimize all aspects of a farming operation. Nevertheless, it is essential that producers take the time and obtain the necessary help to develop their farming operation plan in order to realize their potential and achieve their goals.

A unique solution has been developed to optimize the Eden Shale Farm's beef cattle operation. It consists of developing operational complexes, using existing structures, to improve management efficiency (figures 1 and 2). The complexes consist of repurposed, renovated, older structures to facilitate better farming practices. These structures are now used to serve multiple groups of animals throughout the year (Figure 3). Surrounding these structures are practices that contribute to optimizing beef production and create the complex. The intent of these practices is to optimize the livestock farming system and reduce the drudgery of farming. Nevertheless, these practices create a secondary benefit of soil and water conservation that contribute to livestock production.

## Practices and Principles Utilized for the Eden Shale Cow and Bull Barn Complexes

**Siting**: The barns are located on summit positions. This creates conditions for natural air movement, positive drainage away from the foundation, and beneficial exposure to solar radiation. The facilities are close to public roads and have municipal electric and water utilities, which are considered the least cost alternative.

**Centralized operation**: Creating a hub for feeding, watering, and handling provides a centralized point of operation that improves monitoring of all groups of animals, while at the same time reducing producer inputs.

**Natural ventilation**: Open ridge vents and an open side provides energy free ventilation to keep bedding dry, control odors, and reduce respiratory problems.

**Figure 1.** The cow barn is a collection of interrelated facilities on the same site, which consists of a centralized, multi-purpose facility with implemented practices and procedures to serve multiple groups of animals throughout the year.
Graphic by Donnie Stamper.

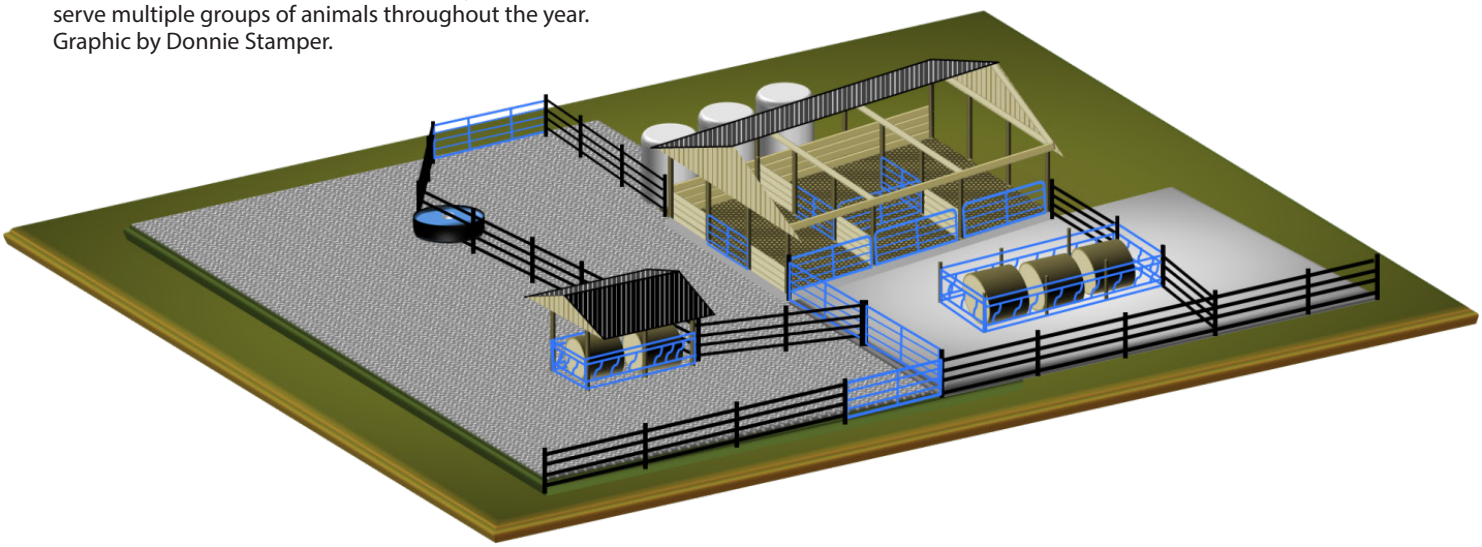
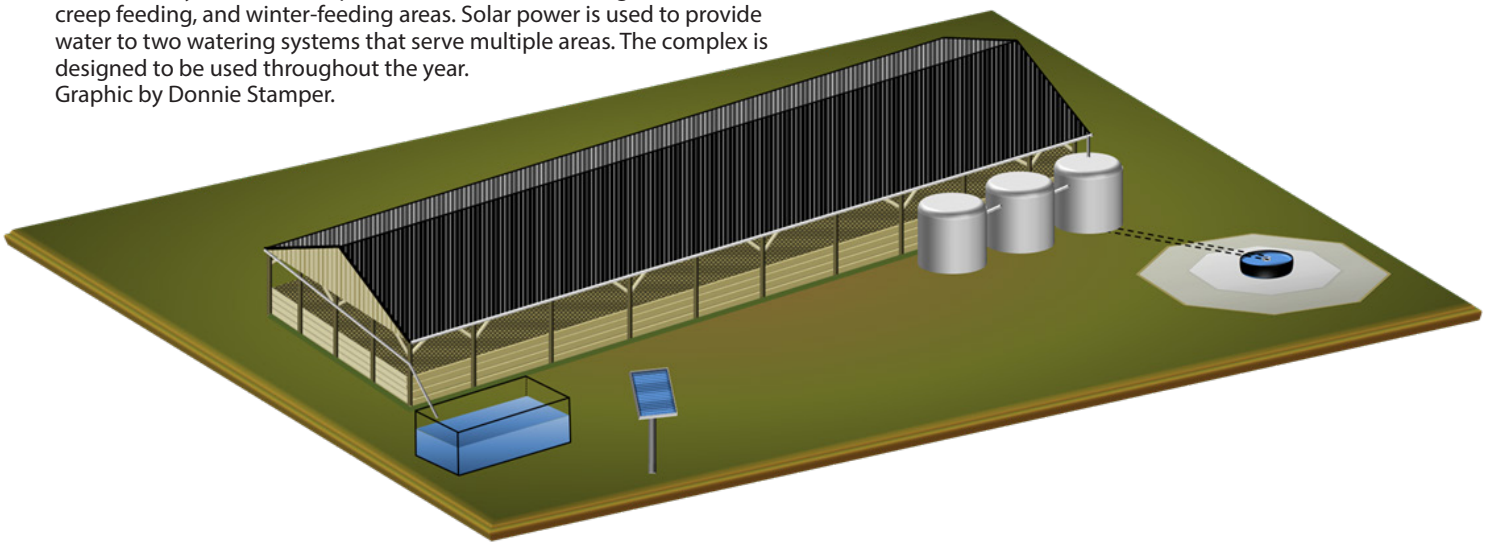


**Figure 2.** The bull barn consists of handling facilities, with a growing facility and maternity area. The complex utilizes water harvesting, runoff control, creep feeding, and winter-feeding areas. Solar power is used to provide water to two watering systems that serve multiple areas. The complex is designed to be used throughout the year.
Graphic by Donnie Stamper.



**Winter and drought feeding area:** All-weather surfaces including concrete, geotextile fabric, and rock are used for controlling mud, limiting erosion, minimizing maintenance diets, and reducing mortalities.

**Stormwater diversion**: Stormwater is diverted away from production areas to keep clean water clean and improve manure cleanup and handling.

**Water harvesting**: Clean water that is diverted away from production areas is collected, stored, and distributed for livestock watering to reduce the cost and dependency on city water sources.

**Renewable resources utilization**: Emphasis is placed on taking advantage of sunlight through passive solar, active solar, and photovoltaic equipment. Rainwater is also used efficiently through harvesting and increased infiltration across pastures. Harnessing wind through natural ventilation is also accomplished. Solar panels and other technologies are used to pump water and keep waterers from freezing. Alternative energy sources can increase the value of off-grid parts of the farm. Future practices may include harnessing wind to power water pumps and electric fences.

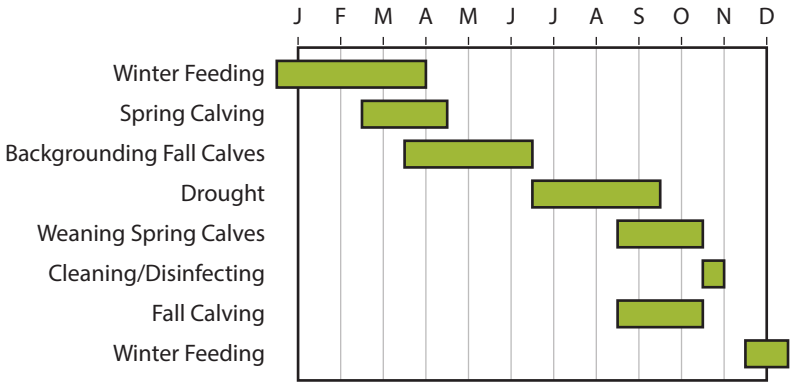
**Energy conservation and efficiency**: A centralized hub for feeding, watering, and handling provides an integrated system that improves resource utilization and creates efficiencies for monitoring, watering, and feeding for multiple groups of animals, while at the same time reducing producer inputs (e.g. fuel, gas, time, medications, forages, labor, etc.).

**Better utilization of water by livestock**: Large diameter tire waterers are used to increase the surface area and volume of water available to livestock. These waterers are designed to serve several groups of animals at the same time. They operate as hybrid systems that use harvested rainwater (if available); if not, a valve can provide city water. A backflow preventer keeps water from siphoning into the city water source.

**Maternity area**: The area under roof is not designed to house the entire herd. Pens consisting of various sizes are used based on need. Occupancy is rotated between first time heifers and cows that have just calved or will soon calve. The concept is to provide a dry, clean bedding area to monitor calves and make sure the heifers take to the calves. Approximately 24 hours is given to a pair before they are ear tagged and turned out with a post-partum group. The design allows approximately 25 percent of the herd to use the indoor facility at one time. The all-weather surface and rolled-out hay used in the nursery area serves to provide a mud-free, centralized feeding and monitoring area.

**Controlled traffic**: Lanes and alleys covered in geotextile fabric and rock (all-weather surfaces) are used to move cattle in and out of the facility. This could not be accomplished without well positioned fences and gates. The management of roof runoff and the selection of winter-feeding sites on summit positions reduce the peak and total volume of runoff, thereby

**Figure 3.** The complexes are used extensively throughout the year for activities that contribute to the handling, care, and production of the livestock operation.



greatly reducing erosion. Positioning on summit positions also increases the vegetative buffering distance to bottom-slope drainages.

**Handling facilities**: A complex that can be accessed by multiple pastures and herds would not be complete without the addition of handling facilities for administering routine or needed treatments. However, a by-product of the systematic design is that it reduces the dependency and volume of pharmaceutical doses needed for livestock compared to operations not utilizing this type of system. This is due to the fact that cows and calves have greater access to clean water, which prevents diseases, and they are drier because of reduced exposure to mud, freezing rain, and wet camping areas.

**Filter strip**: Buffers and filter strips capture runoff water and nutrients. These areas have been subsoiled along the contour to increase infiltration and interseeded to provide diverse and higher yielding forages. These practices create a vegetative terrace that slows runoff and increases infiltration. The combination provides a higher yielding vegetative area that can be utilized as a creep feeding area or flash grazed by the herd.

**Waste reduction and nutrient management**: All-weather surfaces consisting of geotextile fabric and rock traffic pads, concrete, and plastic grids are used to create a solid base for traffic. These surfaces facilitate manure handling, while reducing the volume of wasted forages, cleanup, and bedding required. The benefits of soil organic matter cannot be overstated. Manure and bedding are periodically land applied to increase soil organic matter, infiltration, water holding capacity, and fertility.

**Quality of life**: The idea is to work with and around Mother Nature and not fight it. The goal is to repurpose an existing, underutilized facility to create an optimized, integrated facility, which reduces the drudgery of farming. By having facilities close to public access roads and the main residence, the distance travelled and time the producer has to expend on animal husbandry practices is significantly reduced compared to many traditional practices. By having feeding areas on concrete, and other all-weather surfaces surrounding the facility, driving into pastures and the resulting compaction, mud, runoff, and erosion a feeding area would create is eliminated. Mortalities, maintenance diets, wasted forages, and waste handling are reduced. The integrated design creates a complex that increases the quality of life for the producer and the livestock through an improved system.

## Summary

The establishment of an integrated best management practice system to create a livestock complex contributes to the overall operation to improve beef cattle performance and production, while at the same time improving farm operations and reducing inputs. The concept of these practices is to create a year round complex that utilizes all resources efficiently. Emphasis is placed on utilizing renewable resources to create less dependency on grid based power and water systems. The goal is to create a centralized operation that reduces inputs while increasing the quality of life for the producer and livestock. Byproducts of these practices are increases in natural resource conservation, sustainability, and producer profits. To find out more, schedule a group tour of the Eden Shale Farm by e-mailing **shiggins@uky.edu**. Take a virtual tour of the Eden Shale complexes at **http://arcg.is/1Q7li5k**.

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