

COMPLETE TECHNICAL GUIDE

The Ultimate Guide to Zero Grazing House Designs in Kenya

10-20 Cow Modern Plans: Blueprints, Cost Analysis & Construction Specifications for High-Yield Dairy Farming

Comprehensive Technical Reference for Kenyan Dairy Farmers

Covering Kiambu, Meru, Nyandarua & Uasin Gishu Regions

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Section 1: The Evolution of Zero Grazing House Designs in Kenya



Zero grazing has transformed dairy farming across Kenya's high-potential regions. This section examines why the old free-range model no longer works, how modern housing treats cattle as biological production machines, and the economic mathematics that should guide your decision between a 10-cow and 20-cow operation.

Why Free-Range Grazing is Obsolete in Kiambu, Meru, and Nyandarua

Your grandfather grazed cows on open pasture. You cannot. Land subdivision has destroyed that model.

In Kiambu, the average dairy farm is now half an acre. A single cow needs one acre of pasture to graze without destroying the grass. You cannot keep ten cows on half an acre using free-range methods. The land turns to mud within one rainy season.

Land Reality Check

One cow needs 1 acre of pasture. The average Kiambu dairy farm is now 0.5 acres. The math is simple: free-range grazing is no longer viable in high-density farming regions.

This is why **zero grazing house designs in Kenya** have become the standard in high-potential regions. You confine the cows. You bring the feed to them.

Meru farmers learned this lesson after the 2015 drought. Those with open grazing lost half their herds. Those with zero grazing lost none. Nyandarua is cold and wet. Open grazing in that mud causes foot rot and pneumonia. A good house prevents both diseases.

Uasin Gishu has the space, but maize farming is more profitable than pasture. Zero grazing allows you to grow maize on ninety percent of your land and keep cows on the remaining ten percent.

The logic is simple. You cannot fight land fragmentation. You can only adapt to it.

Zero grazing allows you to keep more cows on less land. It also allows you to collect manure efficiently. That manure becomes fertilizer for your maize or napier grass.

Shifting from Mud Shelters to High-Yield Biomass Factories

Twenty years ago, a cow shed was a wooden shack with a mud floor. That structure is now obsolete.

Mud floors absorb urine. The urine turns into ammonia gas. That gas burns your cow's lungs. A modern unit treats the cow as a biological machine. You feed it silage, water, and minerals. It outputs milk, manure, and heat.

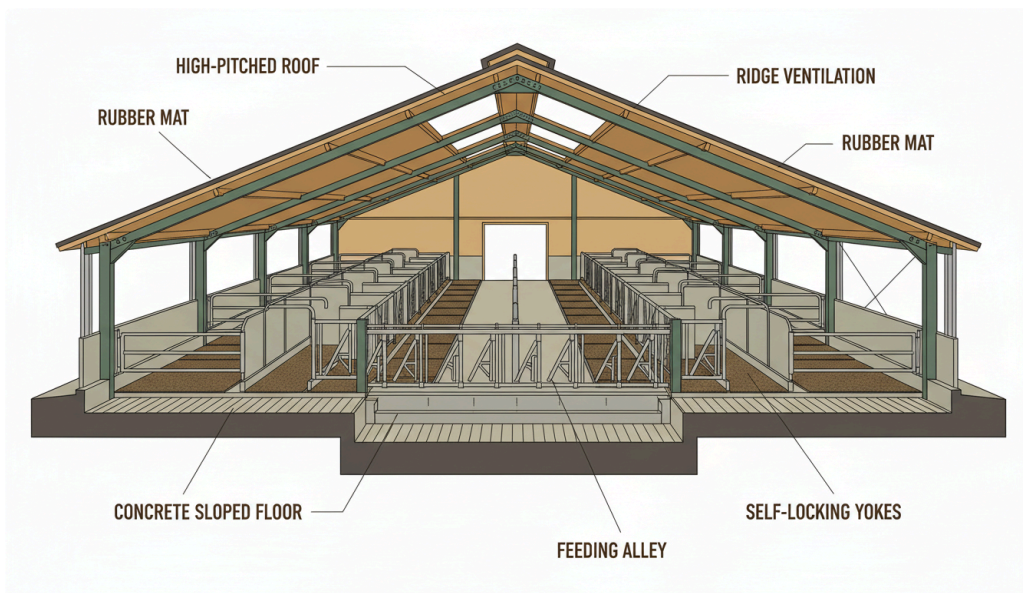


Figure 1: Cross-section of a modern zero grazing unit showing essential components including cubicles with rubber mats, self-locking yokes, sloped concrete floors, and ridge ventilation.

The best **modern zero grazing unit design plans Kenya** now include sloped concrete floors, rubber mats, and self-locking head yokes. These are not luxuries. They are production tools.

Every square meter of your shed must be designed to move manure away from the cow. Gravity does this work for free. Every centimeter of roof height must pull hot air up and out. You do not need fans. You need physics.

Every feeding barrier must force the cow's neck into a natural grazing angle. A bad angle causes drool. Drool loses rumen buffer. Lost buffer kills milk fat.

Essential Components of a Modern Zero Grazing Unit

- **Cubicles** for resting (12 hours/day minimum)
- **Walking area** for movement and dung collection
- **Feed and water troughs** at correct height
- **Milking place** (stall or parlor)
- **Calf pen** separated from main herd
- **Fodder chopping area**

Optional parts include a feed store, a manure storage pit, a roof water catchment system, a water tank, and a holding crush for veterinary work.

Zero grazing requires intensive labor. You cut and carry fodder crops every day. You carry water if you do not have a piped system. You scrape manure twice daily. Proper planning is required before you start. If you are not ready for daily work, zero grazing will fail.

Because zero grazing requires significant capital, build in steps. First construct the essential parts. Add the optional parts as money becomes available.

Economic Realities of 10-Cow vs. 20-Cow Operations

A ten-cow unit produces roughly one hundred and fifty liters per day at fifteen liters per cow. At KSh fifty per liter, that is KSh seven thousand five hundred daily gross revenue.

A twenty-cow unit produces three hundred liters per day. That is KSh fifteen thousand daily gross revenue. The math seems simple. Double the cows, double the money. But the costs do not double linearly.

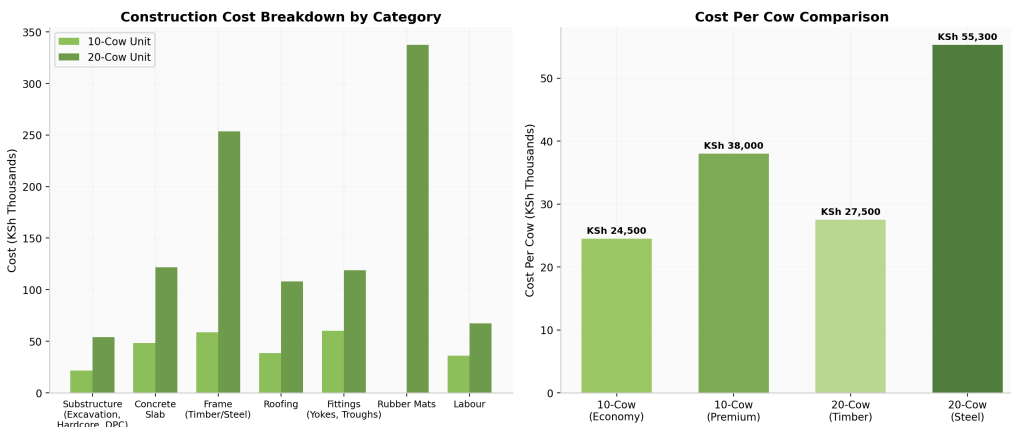


Figure 2: Construction cost breakdown by category and per-cow cost comparison across different unit configurations. The 20-cow steel unit has the highest per-cow cost but offers the best long-term efficiency.

The **zero grazing unit construction cost in Kenya** for ten cows is approximately KSh 245,000 for an economy build. For twenty cows, the cost jumps to KSh 550,000 for timber or KSh 1.1 million for steel.

Why the jump? A twenty-cow unit requires a double-row layout. You need a central feeding alley. You need a wider slab. You need a higher roof for ventilation.

A ten-cow unit can use a single row against a wall. This is simpler and cheaper per cow. The cost per cow for a ten-cow unit is about KSh 24,500. For a twenty-cow steel unit, the cost per cow is about KSh 55,000.

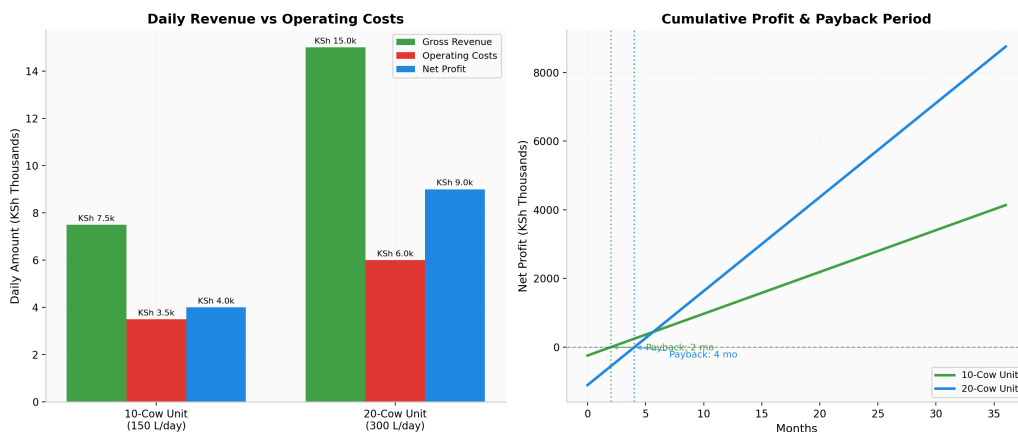


Figure 3: Daily revenue versus operating costs (left) and cumulative profit analysis showing payback periods for 10-cow and 20-cow units.

But the revenue per cow is higher in a twenty-cow unit because you can afford better equipment. A small milking machine costs KSh 80,000. For ten cows, that machine sits idle twenty-three hours per day. For twenty cows, you use it twice daily and the cost per liter drops.

Profitable dairy farming in Kenya at twenty cows requires you to process your own manure into biogas. A ten-cow unit produces enough gas for cooking. A twenty-cow unit produces enough gas to run a small generator.

Why Serious Farmers Skip to 20 Cows

The upfront pain is higher. The long-term profit is exponentially better. A 20-cow unit with proper biogas integration becomes a self-sustaining operation within 24 months.

Low yields in overcrowded structures are most likely because of reduced resting time. Overcrowding decreases the time an animal spends lying down. When cows do not have enough space, they spend more time standing. Standing increases the risk of hoof problems and lameness.

A good rule for cubicle numbers is simple: for one cow, you need two cubicles. For two cows, three cubicles. For three cows, five cubicles. For four cows, six cubicles. For five cows, seven cubicles. For six cows, nine cubicles. This extra capacity accounts for heifers and young stock.

Section 2: How Dairy Cattle Housing Design and Construction Impacts Cow Comfort and Milk Yield



The Biological Link Between Cow Comfort and Milk Yield

A comfortable cow releases oxytocin. Oxytocin is the let-down hormone. It squeezes milk from the alveoli into the teat cistern. An uncomfortable cow releases cortisol. Cortisol is the stress hormone. It blocks oxytocin completely.

This is not theory. This is veterinary physiology. You cannot milk a stressed cow fully.

When a cow is stressed, her body prioritizes survival over production. Blood flow shifts away from the udder. Milk synthesis slows down. The effect is immediate and measurable. A cow that is chased, shouted at, or housed poorly will hold back milk.

You can see this at milking time. A comfortable cow stands still. Her udder fills evenly. Milk flows freely. An uncomfortable cow kicks, steps sideways, or urinates frequently. She is telling you something is wrong.

Dairy cattle housing design and construction directly controls four comfort factors:

The Four Comfort Factors

1. **Floor texture** - Prevents slipping and hoof damage
2. **Air temperature** - Prevents heat stress
3. **Feeding posture** - Ensures proper rumen function
4. **Lying space** - Allows 12 hours of daily rest

Fix these four things and your milk yield will rise. Do not fix them and you will lose money every single day.

The connection between housing and production is so strong that you can predict milk yield by looking at the shed. A dirty, cramped, poorly ventilated shed will never produce high yields. A clean, spacious, well-designed shed with proper flooring and feeding systems will produce maximum yields.

Floor Trauma: How Bad Surfaces Cause Digital Dermatitis



A cow's hoof is made of keratin. The same material as your fingernail. A fingernail cracks on rough concrete. So does a hoof.

Digital dermatitis is the most common cause of lameness in Kenyan zero grazing units. It starts as a small red lesion between the claws. It spreads to the heel. The cow stops walking. A lame cow produces five fewer liters per day. She also eats less because walking to the feed trough hurts.

The cause is always the floor. Smooth concrete is too slippery. Rough concrete cuts the hoof. Wet concrete softens the hoof and invites bacteria.

You can identify a floor problem by watching your cows walk. If they step carefully or refuse to turn sharply, the floor is too slippery. If they limp or stand with a hoof lifted, check for lesions between the claws. If you see swelling above the hoof, the infection has reached the deeper tissues. Call your vet immediately.

How to build a cow shed in Kenya with the correct floor starts with the concrete mix. Use a 1:2:3 cement to sand to ballast ratio. One bag of cement. Two bags of sharp river sand. Three bags of three-quarter inch ballast.

Do not add extra water to make the concrete easier to work. Extra water weakens the concrete. The surface will dust and erode under hoof traffic. Add just enough water to make the mix workable. The concrete should hold together when squeezed but not release water when pressed.

Use a concrete vibrator to remove air bubbles. Air bubbles create weak spots. Weak spots crack.

Grooving Specifications for Cow Safety

Table 1: Grooving the concrete walking surface

Parameter	Specification	Reason
Groove depth	10mm	Deep enough for drainage, shallow enough to prevent tripping
Groove width	10mm	Allows water to flow freely
Spacing between grooves	50mm center-to-center	Provides adequate grip surface
Direction	Parallel to cow movement	Prevents tripping
Timing	Applied when concrete is wet but firm	Ensures clean edges without crumbling
Tool	Steel comb with 6mm rods	Durable enough for repeated use

After grooving, cure the concrete properly. Cover it with polythene sheet for seven days. Sprinkle water twice daily to keep it moist. Concrete that dries too fast becomes brittle. Brittle concrete cracks. Cracked concrete traps manure. Trapped manure breeds more bacteria.

Heat Stress: Why Low Roof Design Reduces Dry Matter Intake

A cow produces heat when she digests feed. A lot of heat. A lactating Friesian generates as much heat as a one hundred watt bulb running continuously. That heat must leave the shed. If it does not, the cow's body temperature rises. Her respiration rate jumps from thirty breaths per minute to over one hundred.

She stops eating. Dry matter intake drops by fifteen percent. Milk yield follows within forty-eight hours.

The culprit is a low roof. Many **zero grazing house designs in Kenya** use a roof height of two point five meters. This is a greenhouse. Heat rises to two point five meters and stops. There is nowhere else to go.

Roof Height Guidelines

- **10-cow unit:** Eave height 3.0m, Ridge height 4.2m
- **20-cow unit:** Eave height 3.5m, Ridge height 5.0m
- **Hot areas:** Eave height 4.0m, Ridge height 5.6m
- **Roof pitch:** 25-30 degrees for all units

The solution is a three point five meter eave height for twenty cows. Hot air rises to the roof ridge. The ridge has a continuous opening covered with wire mesh. The hot air exits. Cool air enters from the sides. No fans. No electricity. Just physics.

You can test your ventilation with a simple match. Light a match at the center of the shed. Watch the smoke. If it rises straight to the ridge and exits, your ventilation works. If the smoke swirls or hangs at head height, you have a problem. Your cows are breathing that same stale air.

Orientation also matters. The long axis of your shed must run east to west. The roof slope faces north and south. This keeps the sun off the cows' flanks. A shed built north to south will cook the cows on the east side in the morning and the west side in the afternoon. Do not make this mistake.

Feeding Barrier Pitfalls: The Danger of Bad Rumen Acidification

A cow's rumen is a fermentation vat. Bacteria break down fiber into volatile fatty acids. Those fatty acids become milk fat. The bacteria need a neutral pH of six point two to six point eight to work. If the pH drops below five point five, the bacteria die. This is acute rumen acidosis. It kills cows.

What causes the pH to drop? Too much grain is one cause. But bad feeding posture is another.



Figure 4: *Self-locking yokes secure cows in the correct feeding position, enabling easy access for veterinary procedures while maintaining proper rumen posture.*

When a cow reaches down and forward to eat, saliva drools out of her mouth. Saliva contains bicarbonate. Bicarbonate is the rumen's buffer. It neutralizes acid. If the cow drools the bicarbonate onto the floor instead of swallowing it, the rumen becomes acidic.

The signs of rumen acidosis are subtle at first. The cow stops chewing her cud. Her dung becomes loose and foamy. She looks lethargic. If you see these signs, check your feeding barrier height immediately.

The barrier height must be set so the cow's neck is at a natural grazing angle. The feed trough must be fifteen centimeters higher than the walking alley. The cow's head should be level, not stretched down.

Self-locking yokes help. They hold the cow in the correct position while she eats. They also allow you to lock each cow for artificial insemination and veterinary work without chasing her around the shed.

A self-locking yoke costs about KSh 4,500 per position. For twenty cows, that is KSh 90,000. This seems expensive. But it pays for itself in reduced labor costs within six months. Without yokes, you need two men to restrain a cow for artificial insemination. With yokes, one man does the job in thirty seconds.

Lying Space Optimization: Meeting the Twelve-Hour Daily Resting Requirement

A cow needs twelve hours of lying time per day. This is not a recommendation. This is a biological requirement.

When a cow lies down, blood flow to the udder increases by twenty-five percent. The udder fills with blood. The blood carries nutrients for milk synthesis. A cow that lies less than ten hours per day produces twelve percent less milk. The milk also has lower fat content because blood flow to the udder is restricted.

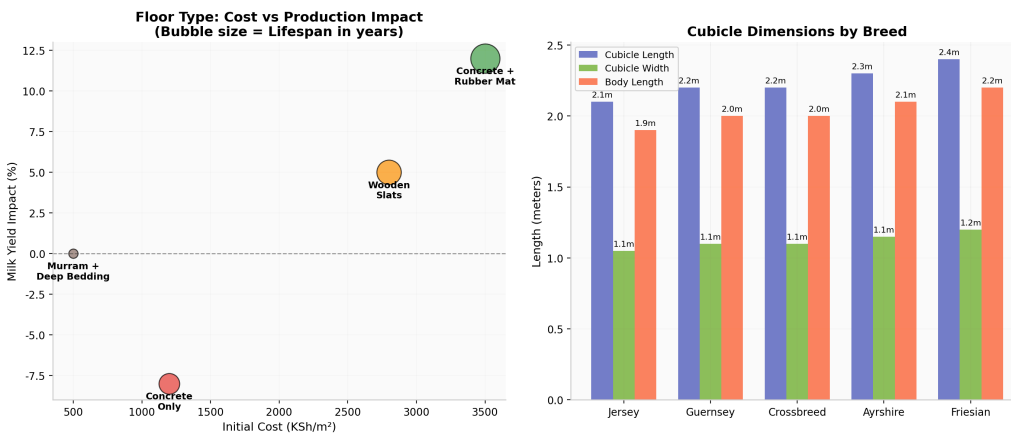


Figure 5: Floor type comparison showing cost versus milk yield impact (left) and cubicle dimensions by breed (right). Concrete with rubber mats provides the best return on investment.

Why do cows stand instead of lie down? The cubicle is too short. The cubicle is too narrow. The floor is too hard. The neck rail is missing.

Correct Cubicle Dimensions for Friesians

- **Cubicle length:** 2.4 meters (allows forward lunge when standing)
- **Cubicle width:** 1.2 meters (prevents touching neighbor)
- **Neck rail height:** 1.1 meters above floor
- **Brisket board height:** 15 centimeters

Perching leads to hoof problems. The back feet stand in wet manure while the front feet rest on dry bedding. The moisture imbalance softens the back hooves. Soft hooves crack.

The neck rail is a horizontal bar set one point one meters above the floor. This bar touches the cow's neck when she stands up. It trains her to step backward before lying down. When she steps back, her dung falls into the walking alley instead of onto the sleeping surface. This simple piece of steel reduces your bedding costs by fifty percent.

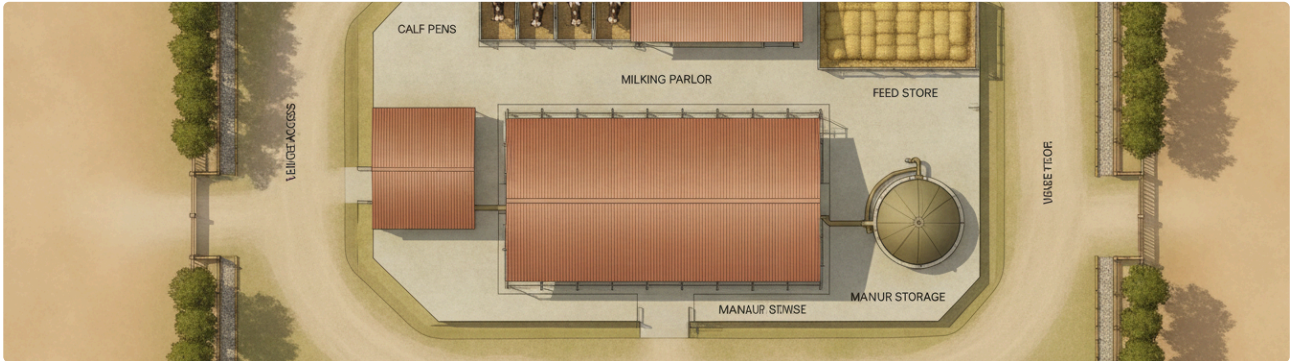
The brisket board is a low curb at the front of the cubicle. It is fifteen centimeters high. The cow's brisket hits this board when she tries to lie too far forward. The board stops her with her rear end still over the alley. Again, this keeps dung out of the sleeping area.

Table 2: Cubicle floor options comparison

Floor Type	Initial Cost (KSh/m ²)	Bedding Cost (KSh/cow/year)	Lifespan (years)	Milk Yield Impact
Murram + deep bedding	500	3,500	1 (bedding changes)	Neutral
Concrete + rubber mat	3,500	800	10	+12% due to comfort
Concrete only	1,200	2,000	5	-8% due to hock damage
Wooden slats	2,800	500	7	+5% (good for calves only)

Rubber mats cost about KSh 2,500 per square meter. For a ten-cow unit, the cubicle area is about fifty four square meters. The mats cost KSh 135,000. This seems expensive. But a rubber mat lasts ten years. Over that decade, you save KSh 300,000 in bedding costs and veterinary bills. The math is clear. Rubber mats pay for themselves in eighteen months.

Section 3: Site Selection and Layout for a 10-20 Cow Unit



How to Read Your Land Before You Build

Before you pour a single bag of cement, walk around your farm with a critical eye. You are not looking for a beautiful spot. You are looking for a functional spot.

The success of **zero grazing house designs in Kenya** depends more on site selection than on the materials you use. A steel frame on a bad site will fail. A wooden frame on a good site will succeed.

Soil Type Assessment

The first question is soil type. Dig a hole half a meter deep where you plan to build. Take a handful of soil from the bottom. Wet the soil and rub it between your fingers. If the soil forms a long snake that does not break, you have clay soil.

Clay soil is dangerous for any structure. Clay expands when wet and contracts when dry. This movement cracks concrete slabs. A cracked slab traps manure and urine. The trapped moisture softens the ground underneath. The slab sinks. Then the walls crack. Then the roof leaks.

If the soil feels gritty and falls apart when you squeeze it, you have sandy loam. This is the ideal soil. Sandy loam drains water quickly. It does not expand or contract with moisture changes. You can pour a thin slab on sandy loam and it will last for twenty years.

Table 3: Soil type assessment for zero grazing construction

Soil Type	Field Test Result	Risk Level	Required Foundation Action
Clay	Forms a long snake that does not break	High	Excavate 300mm, add 200mm hardcore layer
Sandy Loam	Gritty, falls apart when squeezed	Low	Standard 150mm sub-base only
Silt	Sticky but does not form a snake	Medium	Excavate 200mm extra, add drainage ballast
Black Cotton	Shrinks when dry, swells when wet	Very High	Do not build here without deep pile foundation

Orientation and Sun Path

The second question is orientation. Many farmers build their shed facing the road because it looks nice. This is a mistake. The sun does not care about the road. You must orient your building based on the path of the sun.

The long axis of the shed should run from east to west. The roof slope should face north and south. This orientation means the sun hits the roof ridge at midday but does not shine directly into the sides. The cows stay cool. The floor stays dry. The feed does not heat up.

Table 4: Sun orientation guide for different Kenyan regions

Region	Climate Type	Recommended Orientation	Special Adjustment
Kiambu	High altitude, intense UV	East-West axis, open side North	Add shade cloth on South side
Meru	High altitude, moderate	East-West axis, open side South	Catch morning sun for bedding
Nyandarua	Cold, windy	East-West axis, closed West side	Plant windbreak 15m away
Uasin Gishu	Moderate, high rainfall	East-West axis, slope facing North	Prioritize drainage to downhill side

Wind Direction and Ventilation

The third question is wind direction. The prevailing wind in most of Kenya comes from the southeast. In the Rift Valley, wind often comes from the northwest. You must know your local wind pattern. Ask your oldest neighbor. Watch the trees for a full day.

The wind should blow through the shed, not against a solid wall. The open side of your building should face into the prevailing wind. This creates natural ventilation that removes ammonia gas from the urine and carries away heat from the cows' bodies. A shed with no natural ventilation becomes a gas chamber.

Windbreak Guidelines

If you live in a very windy area like Nyandarua or parts of Laikipia, plant two rows of *Grevillea robusta* trees fifteen meters away from the shed. The trees slow the wind without stopping it completely. A complete windbreak creates turbulence that can lift the roof.

Space the trees three meters apart in each row. Stagger the rows so the second row fills the gaps of the first row. By the time the trees are four years old, you will have perfect wind protection.

Distance from Farmhouse and Access

The fourth question is distance from the farmhouse. You want the unit close enough to the house that you can hear a cow in distress at night. You also want it far enough that the smell does not ruin your meals. Twenty meters is the ideal distance.

The fifth question is drainage. Water is the enemy of any structure. You must build your shed on the highest point of your land. Rainwater should flow away from the shed, not toward it.

The sixth question is access. A concrete mixer truck needs to reach your site. A lorry delivering feed needs to reach your feed store. Leave a clear path at least three meters wide from the public road to your shed.

Land Requirements for Ten vs. Twenty Cows

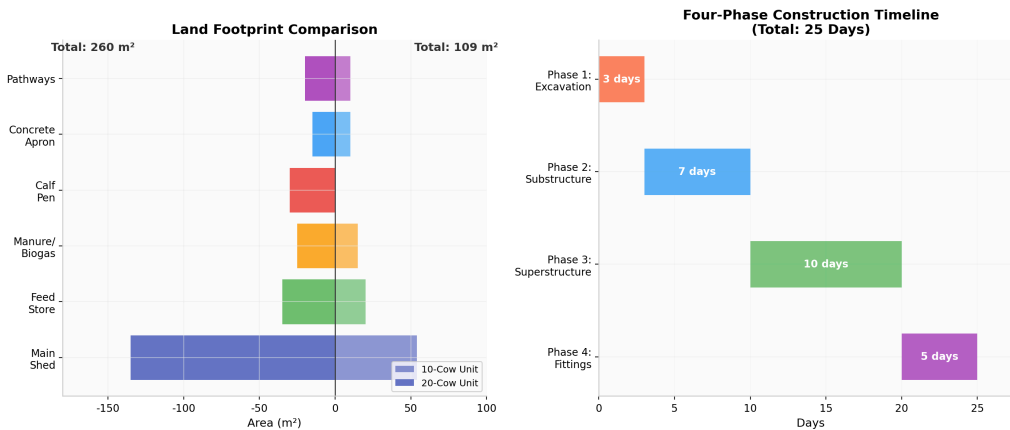


Figure 6: Land footprint comparison by component (left) and the four-phase construction timeline showing typical durations for each phase (right).

For a ten-cow unit, you need a total land footprint of about one hundred square meters. For a twenty-cow unit, you need about two hundred and twenty square meters. The **20 cow dairy farm layout** is not simply twice the length of a ten-cow unit.

Table 5: Land footprint comparison for 10-cow vs 20-cow units

Component	10-Cow Unit Area (m ²)	20-Cow Unit Area (m ²)
Main Shed	54	135
Feed Store	20	35
Manure/Biogas Area	15	25
Calf Pen	Not included	30
Concrete Apron	10	15
Pathways and Turning	10	20
Total Required Land	109 m² (0.11 acres)	260 m² (0.26 acres)

The shed itself for twenty cows measures eighteen meters long by seven point five meters wide. That is one hundred and thirty five square meters. The feed store needs about thirty five square meters. You need space for a small tractor or wheelbarrow to turn around inside. The manure and biogas area needs about twenty five square meters. Your biogas digester will be at least twelve cubic meters in size. The calf pen needs about thirty square meters. You must keep calves at least fifteen meters away from the main herd.

Biosecurity Zoning for Disease Prevention

Your layout must function like a hospital isolation ward. Disease moves through droplets and through your own boots.

The sick bay and calving pen must be at the extreme downwind end of the shed. If your prevailing wind is from the southeast, put the calving pen at the northwest corner. Airborne bacteria from a coughing cow must never blow over the main lactating herd. One sick cow can infect twenty cows if the wind is wrong.

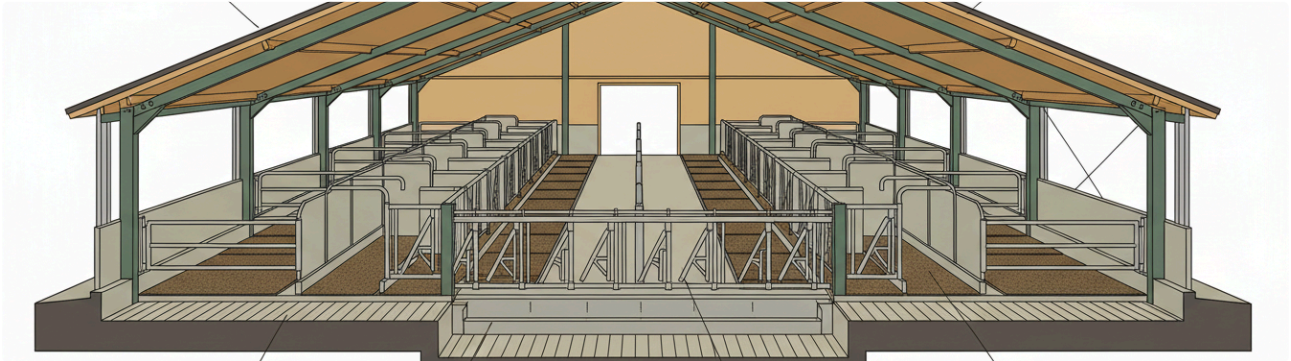
Table 6: Biosecurity distances for zero grazing units

Zone	Location	Minimum Distance from Main Shed	Purpose
Sick Bay	Downwind end	Attached but isolated	Prevent airborne infection spread
Calf Pen	Upwind	15 meters	Protect naive immune systems
Manure Pit	Downhill, downwind	10 meters	Prevent ammonia contamination
Feed Store	Upwind, uphill	5 meters	Keep silage clean
Wheel Bath	Farm entrance	20 meters from shed	Stop diseases from public road

The wheel bath is a simple concrete trough two meters long and thirty centimeters deep. Place it five meters from the public road entrance. Fill the wheel bath with hydrated lime solution. Every vehicle that enters your farm must

drive through this bath. Vehicles bring foot and mouth disease from the market.

Section 4: Technical Architecture and Blueprint Specifications



This section provides the precise measurements and material specifications you need to build a zero grazing unit that maximizes cow comfort, milk production, and operational efficiency. These specifications are based on agricultural engineering research and proven field practices across Kenya.

Resting Cubicle Dimensions for Medium to Large Breeds

The resting cubicle is where the cow spends twelve hours per day. You must get these dimensions exactly right.

For a Friesian or Ayrshire cow, each cubicle must be two point four meters long. In feet, that is roughly eight feet. The cow's body length is about two point two meters from nose to tail. She needs an extra twenty centimeters to lunge forward when she stands up.

If the cubicle is shorter than 2.4 meters, the cow will not lie down properly. She will perch with her front feet in the cubicle and her back feet in the alley. Perching leads to hoof problems. The back feet stand in wet manure while the front feet rest on dry bedding. The moisture imbalance softens the back hooves.

Table 7: Cubicle dimensions by cow breed

Breed	Body Length (m)	Recommended Cubicle Length (m)	Recommended Cubicle Width (m)
Friesian	2.2	2.4	1.2
Ayrshire	2.1	2.3	1.15
Guernsey	2.0	2.2	1.1
Jersey	1.9	2.1	1.05
Crossbreed	2.0	2.2	1.1

The width of each cubicle must be one point two meters. In feet, that is four feet. This width allows the cow to lie flat without touching her neighbor. Cows are social animals, but they do not like to touch each other when sleeping. If the cubicle is narrow, the cow will stand up to avoid contact. Standing reduces milk yield by up to twelve percent.

Table 8: Cubicle component specifications

Component	Height from Floor (m)	Material	Purpose
Neck Rail	1.1	50mm galvanized pipe	Train cow to step back before lying
Brisket Board	0.15	Concrete or hardwood	Stop cow from lying too far forward
Curb (rear)	0.10	Concrete	Contain bedding material
Partition	1.0	Steel pipe or timber	Separate adjacent cows

Cubicle Floor Composition and Bedding

You have three options for the cubicle floor. Each has different costs and benefits.

The first option is compacted murrum covered with sawdust or rice husks. This is the traditional method. It is cheap. It is soft on the cow's knees and hocks. But it requires daily raking and weekly replacement. Bacteria thrive in organic bedding. If you do not replace the bedding frequently, your cows will develop mastitis from lying in their own waste.



Figure 7: *Installing rubber mats in cubicles provides cushioning and significantly reduces bedding costs while improving cow comfort and milk yield.*

The second option is a concrete slab with a rubber mat on top. This is the modern method recommended for serious farmers. The rubber mat provides cushioning. The concrete below provides drainage. You still need a thin

layer of sawdust for absorption, but you use much less than on pure murrum.

Rubber mats cost about KSh 2,500 per square meter. For a ten-cow unit, the cubicle area is about fifty four square meters. The mats cost KSh 135,000. This seems expensive. But a rubber mat lasts ten years. Over that decade, you save KSh 300,000 in bedding costs and veterinary bills. The mats pay for themselves in eighteen months.

The Math on Rubber Mats

Initial investment: KSh 135,000 (for 10-cow unit)

Lifespan: 10 years

Savings over 10 years: KSh 300,000

Payback period: 18 months

Milk yield improvement: +12%

The third option is a concrete slab with no mat. This is the worst option. Concrete is hard. A cow lying on hard concrete develops swollen hocks and calloused knees. The pain reduces lying time. Reduced lying time reduces milk. Never put a cow directly on bare concrete for sleeping. You would not sleep on a concrete floor. Neither should your cow.

Walking Alley Width and Concrete Specifications

The walking alley is the highway system of your unit. Cows must move without hesitation, turning, or slipping.

For a ten-cow unit with a single row of cubicles, the alley must be one point eight meters wide. This allows one cow to pass comfortably. For a twenty-cow unit with double rows facing each other, the alley must be two point four meters wide. This allows two cows to pass each other. It also allows you to push a wheelbarrow filled with manure without hitting the cows.

The alley floor must have a slope of three percent toward the urine collection trench. Three percent means three centimeters of drop for every one meter of length. This gentle slope makes water and urine flow by gravity. You do not need to push water. You do not need to pump. Gravity does the work for free.

Table 9: Concrete mix specifications for zero grazing floors

Location	Mix Ratio (C:S:B)	Slump (mm)	Thickness (mm)	PSI Strength Required
Walking Alley	1:2:3	50	100	3,000
Feeding Trough	1:2:4	40	75	2,500
Cubicle Base	1:3:5	60	75	2,000
Urine Drain	1:2:3	30	100 (walls)	3,500

Grooving the Alley Surface for Slip Resistance

The surface of the alley must be grooved. You cannot leave it smooth. Smooth concrete becomes slippery when wet. A cow slipping on wet concrete will spread her legs into a split position. This tears the muscles of the inner thigh. The cow cannot stand properly for two weeks.

You groove the concrete by dragging a comb through the wet surface. The comb is made by welding six-millimeter steel rods onto a long handle. The rods should be spaced fifty millimeters apart. The grooves should be ten millimeters deep.

Drag the comb parallel to the direction the cows walk. This creates channels for water to drain away while leaving ridges for hoof grip. Do not groove perpendicular to the walking direction. Perpendicular grooves trip the cow. A tripping cow falls. A falling cow breaks bones.

After grooving, cure the concrete properly. Cover it with polythene sheet for seven days. Sprinkle water twice daily to keep it moist. Concrete that dries too fast becomes brittle. Brittle concrete cracks. Cracked concrete traps manure.

Feeding Trough Dimensions and Design

The feeding trough must be on the opposite side of the alley from the cubicles. Each cow needs sixty to seventy five centimeters of trough space. For ten cows, you need a six meter long trough. For twenty cows using a double-row layout, you need fifteen meters of trough.



Figure 8: Self-locking yokes at the feeding trough allow individual cow restraint for veterinary procedures while maintaining correct feeding posture.

The trough must be made of concrete. Wooden troughs rot within three years. Metal troughs rust within five years. Concrete lasts twenty years. The trough should be fifty centimeters wide at the top and thirty centimeters wide at the bottom. The depth should be thirty centimeters at the front where the cow eats.

The bottom of the trough must slope at five percent toward the cow. As the cow eats from the front, the remaining feed slides down the slope. She never has to strain to reach the last bits of silage. Feed waste drops from fifteen percent to less than five percent with a properly sloped trough.

Table 10: Feeding trough dimensions by cow capacity

Number of Cows	Linear Trough Length (m)	Trough Configuration	Estimated Concrete Volume (m ³)
10 (single row)	6.0	One side only	0.8
15 (single row)	9.0	One side only	1.2
20 (double row)	15.0	Two sides (central)	2.0
20 (single row)	12.0	One side only	1.6

Watering Troughs and Flow Rate Requirements

Water intake drives milk synthesis. A lactating Friesian drinks eighty to one hundred and twenty liters per day. If water is unavailable for four hours, milk drop persists for forty-eight hours. The cow cannot recover quickly from dehydration.

Your water troughs must be automatic. Manual troughs that you fill with a hose will cost you two hours of labor every day. Automatic troughs use a float valve that keeps the water at a constant level. The cow pushes a paddle, and fresh water flows.

Table 11: Water requirements and trough specifications

Cow Capacity	Daily Water Need (liters)	Number of Auto Troughs	Minimum Flow Rate (L/min)	Pipe Diameter (inches)
10	1,000	1	15	1.0
15	1,500	2	20	1.25
20	2,400	2	25	1.5
20 (high yield)	3,000	3	30	2.0

You need one automatic trough for every ten cows. Place the trough at the exit of the milking parlor. Cows are thirsty after milking. They will drink heavily. This post-milking drink stimulates the next let-down reflex for the next milking.

Water System Tips

- Use Class 150 PVC pipe of at least one inch in diameter
- Bury the pipe half a meter deep to keep the water cool
- Insulate any exposed sections with foam lagging
- Sun-heated water reduces intake by thirty percent
- A cow will not drink warm water

Milking Parlor Design for Ten to Twenty Cows

For a ten-cow unit, a simple shed with a single milking stall is enough. You milk one cow at a time. The process takes about one hour.

For a twenty-cow unit, you need a swing-over parlor. This is a pit one meter deep and one point two meters wide. The pit is six meters long. Ten cows stand on the left side of the pit. Ten cows stand on the right side.

The milker stands in the pit at udder height. He attaches the milking machine to the left side cows, then swings the machine over to the right side cows. He never has to bend over. His back stays straight. His speed increases. Ten cows are milked in thirty minutes instead of one hour.

Table 12: Milking parlor specifications by herd size

Herd Size	Parlor Type	Pit Length (m)	Number of Stalls	Milking Time (minutes)
10	Single stall	Not applicable	1	60
10	Swing-over	3.0	5 per side	30
20	Swing-over	6.0	10 per side	35
20	Herringbone	5.0	10 per side	25

The floor of the milking pit must be non-slip. Use diamond checker plate aluminum or deep-grooved concrete with ten millimeter grooves at thirty millimeter spacing. Wet rubber boots slip on smooth concrete. A fallen operator means broken bones and a stopped milking shift.

Roof Height and Ventilation Requirements

The roof must be high enough to allow heat to rise away from the cows. For a ten-cow unit, the eave height should be three meters. For a twenty-cow unit, the eave height should be three point five meters. The roof pitch should be twenty five degrees.



Figure 9: High-pitched roof design with continuous ridge opening creates natural convection that removes hot air and ammonia without electricity.

This is steep enough to shed rainwater quickly and create a convection current that pulls hot air out through the ridge. The ridge should have a continuous opening covered with wire mesh. This opening acts as a chimney. Hot air rises and exits through the ridge. Cool air enters through the open sides. You do not need electric fans. Natural ventilation is free.

Table 13: Roof and ventilation specifications

Cow Capacity	Eave Height (m)	Ridge Height (m)	Roof Pitch (degrees)	Required Ridge Opening (mm)
10	3.0	4.2	25	100
15	3.2	4.5	25	120
20	3.5	5.0	25	150
20 (hot area)	4.0	5.6	30	200

Use pre-painted GCI sheets for the roof. The paint reflects sunlight. A reflective roof stays cooler than a bare metal roof. The temperature difference is as much as ten degrees Celsius. For the ten percent of the roof that sits over the feeding alley, use translucent sheets. These sheets allow natural light to enter the shed. Cows can see their feed clearly. They eat more. They produce more milk.

Section 5: Material Procurement and Cost Analysis in KES for 2026



This section provides detailed, itemized cost breakdowns for building both 10-cow and 20-cow zero grazing units in Kenya. All prices are in Kenyan Shillings (KES) and reflect 2026 market rates. Costs vary by region and supplier, so use these figures as a planning baseline and source quotes from at least three suppliers before purchasing.

Timber Frame vs. Galvanized Steel Frame

The frame of your unit is the skeleton. It holds the roof and supports the walls. You have two main options.

Treated Eucalyptus or Cypress timber is the traditional choice. It is cheaper upfront. A ten-cow timber frame costs about KSh 85,000. A twenty-cow timber frame costs about KSh 150,000. But timber has problems. Termites love eucalyptus sap. Even with treatment, termites find a way within eight years. Timber also rots where it touches the concrete floor.

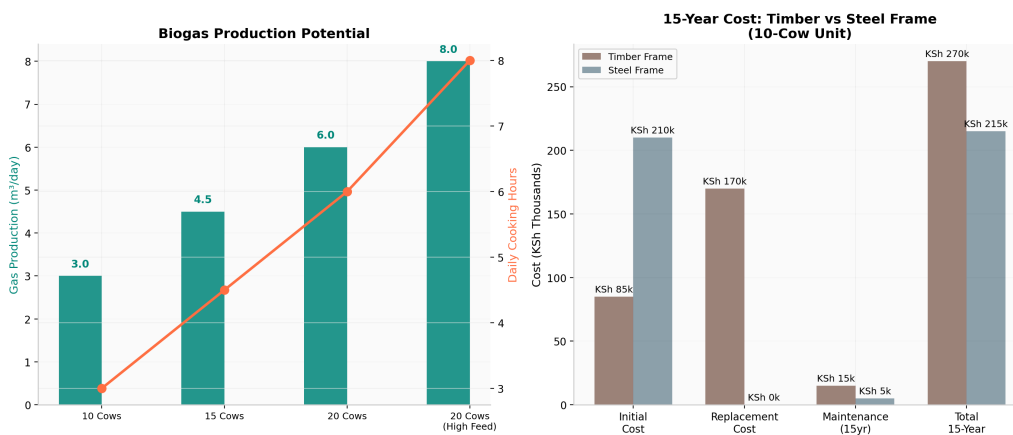


Figure 10: Fifteen-year cost comparison between timber and steel frames (left) and biogas production potential by herd size (right). Steel becomes cheaper over the long term despite higher initial cost.

Galvanized steel is the modern choice. It costs more upfront but lasts three times longer. A ten-cow steel frame costs about KSh 210,000. A twenty-cow steel frame costs about KSh 380,000. Steel does not rot. Termites cannot eat it. It does not warp in the sun. It does not absorb moisture. Over fifteen years, steel is cheaper than timber because you replace timber twice in that period.

Table 14: Timber vs. steel frame comparison for zero grazing units

Parameter	Treated Timber (Cypress)	Galvanized Steel (Box Section)
Lifespan (years)	8-10	25+
10-cow frame cost (KES)	85,000	210,000
20-cow frame cost (KES)	150,000	380,000
Termite risk	High	Zero
Maintenance	Re-treat with used oil every 2 years	None
Fire risk	Moderate	Low
15-year total cost (KES)	255,000 (two replacements)	380,000 (one installation)

Roofing Material Selection

The roof protects your cows from sun and rain. It also affects the temperature inside the shed. Pre-painted GCI sheets are the best choice for most farmers. The paint reflects sunlight. A reflective roof stays cooler. Gauge 30 sheets are thicker than gauge 32. They cost more but last longer and do not dent easily.

Table 15: Roofing material costs and specifications (2026 prices)

Material	Gauge	10-Cow Cost (54m ²)	20-Cow Cost (135m ²)	Lifespan (years)	Heat Reflection
Pre-painted GCI	30	32,400	81,000	20	High
Pre-painted GCI	32	27,000	67,500	15	High
Translucent sheets	N/A	6,500	16,250	5	Low
Standard mabati	32	24,300	60,750	5	Low
Aluminum sheet	28	54,000	135,000	30	Very High

Translucent sheets should cover ten percent of your roof. Place them directly over the feeding alley. The cows can see their feed clearly. Natural light reduces your electricity bill. You do not need lights during the day. Standard mabati (gauge 32) is cheaper but rusts within five years. Rust drips onto the cows. The brown stains are unsightly and the metal weakens.

Complete Cost Breakdown for 10-Cow Unit

The **cost of building a 10 cow zero grazing unit** depends on your choice of materials. Economy uses timber and no rubber mats. Premium uses steel and full rubber mats.

10-Cow Unit Summary

Economy build (timber, no mats): KSh 244,750

Premium build (timber + rubber mats): KSh 379,750

Daily gross revenue (150L @ KSh 50/L): KSh 7,500

Payback period: Approximately 18 months

Table 16: Itemized cost of building a 10 cow zero grazing unit (2026 KES)

Item	Quantity	Unit Cost	Total (Economy)	Total (Premium)
Excavation	54m ² x 0.3m	150/m ³	2,430	2,430
Hardcore fill	5 tonnes	1,800/tonne	9,000	9,000
DPC polythene	54m ²	180/m ²	9,720	9,720
Cement (Bamburi)	30 bags	750/bag	22,500	22,500
River sand	4 tonnes	1,500/tonne	6,000	6,000
Ballast	7 tonnes	2,200/tonne	15,400	15,400
Grooving labour	Lump sum	3,500	3,500	3,500
Timber posts	18 pieces	850/piece	15,300	15,300
Wall rails	30 pieces	550/piece	16,500	16,500
Roof trusses	6 pieces	4,500/piece	27,000	27,000
GCI sheets	30 sheets	1,080/sheet	32,400	32,400
Nails and ridge	Lump sum	6,000	6,000	6,000
Self-locking yokes	10 units	4,500/unit	45,000	45,000
Water troughs	2 units	3,500/unit	7,000	7,000
PVC pipes	Lump sum	8,000	8,000	8,000
Rubber mats	54m ²	2,500/m ²	0	135,000
Mason labour	10 days	1,200/day	12,000	12,000
Carpenter labour	8 days	1,200/day	9,600	9,600
General labour	24 man-days	600/day	14,400	14,400
GRAND TOTAL			244,750	379,750

Complete Cost Breakdown for 20-Cow Unit

The **zero grazing unit construction cost in Kenya** for a 20-cow unit is significantly higher per cow. But the efficiency is better. The economy version with timber and no mats is roughly KSh 550,000. The steel frame version with rubber mats is KSh 1,105,800.

20-Cow Unit Summary**Economy build (timber, no mats):** KSh 550,000**Premium build (steel + rubber mats):** KSh 1,105,800**Daily gross revenue (300L @ KSh 50/L):** KSh 15,000**Payback period:** Approximately 24 months**Table 17: Itemized cost of building a 20 cow unit (steel frame, 2026 KES)**

Item	Quantity	Unit Cost	Total
Excavation	135m ² x 0.4m	150/m ³	8,100
Hardcore fill	12 tonnes	1,800/tonne	21,600
DPC polythene	135m ²	180/m ²	24,300
Cement (Bamburi)	80 bags	750/bag	60,000
River sand	10 tonnes	1,500/tonne	15,000
Ballast	18 tonnes	2,200/tonne	39,600
Grooving labour	Lump sum	7,000	7,000
Steel box posts	28 pieces	2,200/piece	61,600
Steel purlins	120 meters	850/meter	102,000
Steel roof trusses	12 pieces	7,500/piece	90,000
GCI sheets	70 sheets	1,180/sheet	82,600
Translucent sheets	8 sheets	1,950/sheet	15,600
Nails and flashings	Lump sum	12,000	12,000
Self-locking yokes	20 units	4,500/unit	90,000
Water troughs	4 units	3,500/unit	14,000
PVC pipes	Lump sum	15,000	15,000
Rubber mats	135m ²	2,500/m ²	337,500
Calf pen slats	5 pens	8,000/pen	40,000
Lead mason	15 days	1,500/day	22,500
Steel fabricator	10 days	1,800/day	18,000
General labour	45 man-days	600/day	27,000
GRAND TOTAL			1,105,800

Where to Source Materials for the Lowest Price

Cement is cheapest at the Bamburi depot on Mombasa Road. Buy a full pallet of fifty bags. The price drops to KSh 730 per bag. Ballast is cheapest from quarries in Ruiru or Kiwanja Ndege in Nakuru. But transport doubles the price beyond fifty kilometers. Source within thirty kilometers of your farm.

Table 18: Material sourcing guide for best prices in Kenya

Material	Best Source	Location	Bulk Discount Available	Contact
Cement	Bamburi Depot	Mombasa Road, Nairobi	Yes (pallet of 50 bags)	0709 111 000
Ballast	Ruiru Quarry	Ruiru, Kiambu	Yes (10 tonnes+)	Local transporter
Treated timber	Timsales	Thika Road, Nakuru	Yes (50 pieces+)	0709 222 000
Steel sections	Kinungi Steelworks	Nakuru Town	Yes (100m+)	0721 333 444
GCI sheets	Mabati Rolling Mills	Various (factory direct)	Yes (100 sheets+)	0800 444 555
Rubber mats	Kenpoly	Industrial Area, Nairobi	Yes (50m ² +))	0720 666 777

Treated timber is best from Timsales on Thika Road or in Nakuru. Cypress four by four posts cost KSh 800 each when bought in bulk. Steel sections are cheapest from Kinungi Steelworks in Nakuru. Fifty by fifty box section costs KSh 2,100 per piece. GCI sheets are ten percent cheaper when bought directly from Mabati Rolling Mills factory. Call their sales office and ask for farm pricing. Rubber mats are cheapest from Kenpoly in Industrial Area, Nairobi. Factory price is KSh 2,400 per square meter. Self-locking yokes are cheapest when fabricated by a local welder in Nyandarua or Kipipiri. Bring them a drawing. They will charge KSh 3,800 per yoke.

Section 6: Waste Management, Biogas Integration, and Ventilation



A modern zero grazing unit is not just a housing structure. It is an integrated system where waste becomes energy and fertilizer. This section covers manure collection, biogas digester sizing, and ventilation mechanics that keep your cows healthy and productive.

Manure and Urine Collection Trenches

A cow produces about twenty five kilograms of manure per day. For twenty cows, that is half a tonne daily. You cannot let this pile up inside the shed. The ammonia gas will burn your cows' lungs.

The urine collection trench runs along the back of the cubicles. It is fifteen centimeters wide and ten centimeters deep. The trench slopes at two percent toward the collection pit. Gravity moves the urine. You do not pump.

The walking alley slopes at three percent toward the same trench. Every time you hose down the alley, the water carries manure into the trench. The trench must have a removable grating. The grating stops large solids from blocking the pipe. You lift the grating weekly and scrape out the solids.

Waste Separation Rule

The solids go to the compost pile. The liquids go to the biogas digester. Separate them. Mixed waste does not digest well.

Table 19: Manure collection and trench specifications

Parameter	10-Cow Unit	20-Cow Unit
Daily manure production (kg)	250	500
Trench width (cm)	15	20
Trench depth (cm)	10	15
Trench slope	2%	2%
Collection pit size (m ³)	5	10
Emptying frequency (weeks)	4	3

Biogas Digester Sizing and Placement

A **20 cow dairy farm layout** must include a biogas system. You are wasting money if you do not capture that methane.

A ten-cow unit produces enough gas for cooking two meals daily for a family of six. A twenty-cow unit produces enough gas to run a small generator for four hours. The digester must be at least twelve cubic meters for ten cows. For twenty cows, you need sixteen cubic meters.



Figure 10: A properly sized biogas digester captures methane from manure, providing free cooking gas and electricity while producing odorless fertilizer for crops.

Place the digester at least three meters away from the main shed. Any closer and the digester's acidic fumes will corrode your roof sheets. The digester must be downhill from the shed. The manure slurry flows by gravity. You do not want to carry wet manure uphill.

The outlet pipe from the shed to the digester must be at least four inches in diameter. Small pipes block with hair and undigested feed. The slurry storage pit sits next to the digester. After the digester produces gas, the leftover slurry flows into this pit. This slurry is excellent fertilizer. It has no smell. It kills weed seeds. Apply it to your napier grass fields.

Table 20: Biogas digester sizing for zero grazing units

Cow Capacity	Digester Size (m ³)	Gas Production (m ³ /day)	Daily Cooking Hours	Generator Running Time (hours)
10	12	3	3	1
15	14	4.5	4.5	1.5
20	16	6	6	2
20 (high feed)	20	8	8	2.5

Ventilation Mechanics for Ammonia Removal

Ammonia is lighter than air. It rises. Your roof design must give it a path to escape. The open side of your shed should face the prevailing wind. The wind blows through the shed and carries ammonia with it.

The eave height must be at least three meters for ten cows and three point five meters for twenty cows. Low eaves trap ammonia at cow nose level. The ridge opening must be continuous along the entire roof length. A gap of 150mm is enough. Cover it with wire mesh to keep birds out.

Birds carry Newcastle disease. The mesh should be galvanized. Plastic mesh degrades in UV light within two years.

The walls should not be solid on all sides. The north and south walls should be open. Only the east and west walls need partial closure for sun protection. If you must close walls due to theft or cold, use shade cloth instead of iron sheets. Shade cloth stops thieves but lets air pass.

Table 21: Ventilation specifications by shed size

Parameter	10-Cow Unit	20-Cow Unit
Eave height (m)	3.0	3.5
Ridge height (m)	4.2	5.0
Ridge opening (mm)	100	150
Open wall area (%)	60	70
Air changes per hour (minimum)	8	10

Section 7: Strategic Action Plan and Frequently Asked Questions



Four-Phase Construction Timeline

Building a zero grazing unit takes planning. Do not rush. Do not pour concrete in the rainy season.

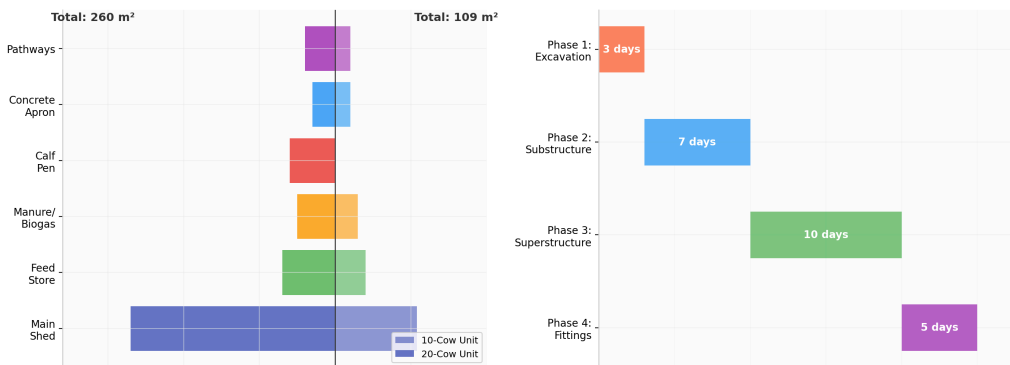


Figure 11: The four-phase construction timeline ensures proper sequencing of work. Total construction time is approximately 25 days with a skilled crew.

Phase 1: Excavation and Substructure (Week 1)

Clear the site of vegetation. Mark the corners with wooden pegs. Excavate to the required depth. Compact the sub-base with a hand compactor. Lay the DPC polythene. Pour the hardcore layer. Compact again.

Phase 2: Concrete Slab and Drainage (Week 2)

Pour the concrete slab for the walking alley first. Let it cure for three days. Then pour the cubicle bases. Then pour the feeding trough. Do not pour everything at once. The concrete will crack as it shrinks.

Phase 3: Superstructure and Roofing (Week 3 to 4)

Erect the posts. Ensure they are plumb using a spirit level. Fix the wall rails. Install the roof trusses. Screw down the GCI sheets. Do not use nails. Nails lift in the wind. Use self-tapping screws with rubber washers.

Phase 4: Fittings and Finishing (Week 5)

Install the self-locking yokes. Plumb the water troughs. Lay the rubber mats. Install the calf pen slats. Test the drainage with a bucket of water. The water should reach the collection pit within two minutes.

Table 22: Four-phase construction timeline

Phase	Duration	Key Activities	Materials Required
1: Excavation	3 days	Clearing, digging, compacting	Shovels, compactor, pegs
2: Substructure	7 days	Hardcore, DPC, concrete slab	Ballast, cement, sand, polythene
3: Superstructure	10 days	Posts, rails, trusses, roofing	Timber/steel, screws, GCI sheets
4: Fittings	5 days	Yokes, troughs, pipes, mats	Steel, PVC, rubber

Frequently Asked Questions

1. Where can I download a reliable 10 cow zero grazing unit plan PDF?

KALRO has free PDF plans at their regional offices in Naivasha, Embu, and Kitale. You can also visit the Ministry of Agriculture website. The search term is "zero grazing unit blueprints." Do not buy plans from social media sellers. Most are copied from outdated Tanzanian designs that do not fit Friesian cows.

2. How do I stop cows from slipping and injuring joints on wet concrete?

You must groove the concrete. A smooth trowel finish is dangerous. Drag a steel comb through the wet concrete parallel to the walking direction. Grooves should be ten millimeters deep and fifty millimeters apart. If your slab is already poured and smooth, you can cut grooves using an angle grinder with a diamond blade. This takes one full day for a twenty-cow unit.

3. Is wood or concrete better for a resting cubicle floor?

Neither alone is best. Concrete with a rubber mat on top is the gold standard. The concrete provides drainage. The rubber provides cushioning. Wooden slats are good for calves but too slippery for adult cows. Bare concrete causes swollen hocks. Deep bedding of sawdust over murrum is acceptable if you change it weekly.

4. What are the legal or county permit requirements for setting up an urban cow shed in Kenya?

You need a construction permit from your county government. In Kiambu, Nairobi, and Uasin Gishu, any structure over fifty square meters requires approval. Your shed must be at least ten meters from any neighbor's house. The manure pit must be at least thirty meters from any borehole or well. Contact your local agricultural officer. They will inspect your **zero grazing house designs in Kenya** before construction. The permit fee is between KSh 5,000 and KSh 15,000 depending on the county.

5. How often should I replace rubber mats in the cubicles?

Good quality rubber mats last ten years. Inspect them every six months. If you see cracks or soft spots, replace that section. Mats fail faster if cows have sharp hooves. Trim hooves every six months. A sharp hoof cuts rubber like a knife.

6. Can I convert an existing free-range shed into a zero grazing unit?

Yes, but you will spend almost as much as building new. Free-range sheds have the wrong orientation. They have mud floors that need removal. They have low roofs that trap heat. You must pour a new slab, raise the roof, and install cubicles. Sometimes it is cheaper to build fresh on a better site.

7. What is the ideal stocking density for a 20 cow dairy farm layout?

Do not put twenty cows in a shed designed for twenty cows. You need spare capacity for heifers and sick cows. Build for twenty-four cows. This gives you four spare cubicles. One for a growing heifer. One for a sick cow in isolation. One for a cow that is about to calve. One for a cow with a leg injury that needs extra space.

8. How much does a self-locking yoke cost to fabricate locally?

A welder in Kinungi or Nyandarua will charge KSh 3,800 to KSh 4,500 per yoke. Bring a drawing with exact measurements. The steel costs about KSh 2,000 per yoke. The welder's labour is the rest. Factory-made yokes cost KSh 8,000 each. Local fabrication is cheaper but check the welding quality. Poor welds snap under a struggling cow.

9. What is the payback period for investing in a zero grazing unit?

For a ten-cow unit costing KSh 245,000, the payback period is about eighteen months. Your milk revenue increases by KSh 150 per cow per day compared to poor housing. That is KSh 1,500 daily for ten cows. Over eighteen months, that is KSh 810,000. The unit pays for itself and then generates profit. For a twenty-cow steel unit at KSh 1.1 million, the payback period is about twenty four months.

10. Do I need a separate milking parlour or can I milk in the main shed?

You can milk in the main shed for ten cows. For twenty cows, you need a separate parlour. Milking in the main shed creates wet floors. Wet floors soften hooves. Soft hooves get digital dermatitis. The parlour isolates the wet area to a small zone. The rest of the shed stays dry.

11. What is the best bedding material for zero grazing units in Kenya?

Rice husks are best. They absorb three times their weight in moisture. They do not compact into a hard mat. They are cheap in rice-growing areas like Mwea and Ahero. Sawdust is second best. It absorbs well but compacts after one week. Wheat straw is third. It is comfortable but does not absorb urine. Change rice husks every ten days. Change sawdust every seven days. Change straw every five days.

12. How high should the feed trough be from the floor?

The bottom of the trough should be fifteen centimeters higher than the walking alley. This puts the cow's neck at a natural grazing angle. If the trough is too low, the cow drools saliva onto the floor. If the trough is too high, the cow cannot reach the last bit of silage. Fifteen centimeters is the exact height measured by animal scientists.

Quick Reference: Common Problems and Solutions

Table 23: Quick reference for common zero grazing problems and solutions

Problem	Likely Cause	Solution	Estimated Cost (KES)
Cows slipping	Smooth concrete	Groove the surface	5,000 (labour)
Lameness	Standing water	Fix drainage slope	10,000 (re-screeding)
Low milk yield	Heat stress	Raise roof, add ridge vent	50,000 (modification)
Mastitis	Wet bedding	Add rubber mats, change bedding more often	135,000 (mats)
Cow fights at feed trough	Insufficient space	Widen trough or reduce cows per group	20,000 (extension)
Ammonia smell	Poor ventilation	Open north and south walls	0 (remove sheets)
Feed waste	Bad trough slope	Re-cast trough with 5% slope	15,000
Scours in calves	Cold concrete floor	Add raised wooden slats	40,000 (5 pens)

Build Smart. Farm Profitably.

This guide provides the technical foundation for building a zero grazing unit that maximizes cow comfort, milk yield, and long-term profitability. The principles remain the same whether you start with five cows or fifty: proper design pays for itself.

Zero Grazing House Designs in Kenya | 2026 Edition