



TECHNICAL SPECIFICATION

GSO Goat Raising Project

*Small-Ruminant Production for Chankiek Village, Sala Lek 5
Cham Minority Community — Mekong River Floodplain, Kampong Cham Province*

Prepared for

GLOBAL STUDENT OUTREACH

Food Security • Sustainable Livelihoods • Forest & Wildlife Protection • Climate Resilience — Rural Cambodia

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Target Cost per Starter Doe Unit: USD \$150–\$250 | Shelter Budget Tiers: Small \$1,000 / Medium \$2,000 / Large \$3,000

1. Executive Summary

This specification defines a low-input goat raising program for Global Student Outreach (GSO) communities in Chankiek Village, Sala Lek 5 — a Cham Muslim minority community on the Mekong River floodplain in Kampong Cham Province, Cambodia. Goats are well suited to this mixed rice-paddy and seasonal-lake landscape: they graze paddy dikes and post-harvest rice stubble, browse fodder trees and shrubs along field margins, and convert crop residues and lake-edge grassland into milk and meat for household consumption and income.

Goat production in Chankiek presents a markedly different risk profile than in Cambodia's wet forest zones. Annual rainfall is moderate (1,400–1,600 mm) with a pronounced six-month dry season (November–April), and grazing takes place on open, sun-exposed paddy dikes and seasonal-lake grassland rather than dense, shaded jungle understory. These conditions are far less favorable to internal parasites — particularly the barber pole worm (*Haemonchus contortus*) — than the high-rainfall, closed-canopy conditions of Cambodia's mountain forests. Field and literature-based estimates place kid mortality attributable to barber pole worm at roughly 5–10% in this environment, compared with 30–50% documented in tropical high-rainfall jungle systems.

The dominant environmental hazard in Chankiek is instead the annual Mekong flood pulse: rising river and seasonal-lake water levels between July and October can submerge low-lying ground for weeks at a time and, in high-water years, reach village house-lots. Free-roaming and feral village dogs remain a significant predation risk to kids, as in most rural Cambodian communities, and goats must be kept off actively planted rice paddies to avoid crop damage and community conflict.

This document addresses these Chankiek-specific conditions with grazing and browse management protocols suited to a paddy / grassland / floodplain system, a lighter-touch parasite control program appropriate to the reduced risk, flood-resilient elevated shelter designs, and three tiered shelter budgets (Small \$1,000 / Medium \$2,000 / Large \$3,000) featuring tin roofing, chain-link fencing, shade wrap / mosquito netting, 1.8 m elevated platforms with gapped slatted floors for manure collection, and night-security pens. The design prioritizes flood safety, hygiene, and dog-attack prevention while remaining buildable by community crews using locally available materials.

2. Why Goats for Chankiek — Pros & Cons

2.1 Pros

Advantage	Explanation
Grazers and browsers	Goats thrive on paddy-dike grass, field margins, fodder trees, and shrubs — vegetation abundant around Chankiek's rice paddies and does not require forest access.
Post-harvest stubble grazing	After the November–December rice harvest, goats graze rice stubble across the village's paddy land at no cost — a major dry-season feed source unavailable in forest systems.
Seasonal lake grassland	As the seasonal lake recedes from November through April, it exposes wide areas of grassland that provide free, high-quality dry-season grazing for the whole herd.
Flat, open terrain	Chankiek's paddy dikes and lake margins are easy for goats and herders to move across, unlike steep jungle terrain, simplifying daily supervision and browse rotation.
Small frame, low feed demand	Indigenous / crossbred does (25–35 kg) require only 2–3% of body weight in dry matter daily — roughly 0.7–1.0 kg — achievable on paddy dikes and stubble alone.

Advantage	Explanation
High reproductive rate	Does can kid twice per year under good management, with 1–2 kids per birth. A starter doe can produce 3–6 marketable kids within 24 months.
Fast turnover	Kids reach 15–20 kg market weight in 6–8 months — faster than cattle (18–24 months) — providing quicker household income.
Manure value for rice fields	Goat pellets are a concentrated, dry, high-value organic fertilizer. Collected from elevated slatted floors, they can be applied directly to the family's rice paddy or sold to neighboring farmers.
Milk production	1–2 L/day during lactation provides household protein and can be consumed fresh or sold.
Low capital entry	A starter doe costs \$80–\$150 locally. A basic shelter starts at \$1,000, accessible to smallholders with limited capital.
Gender equity	Goats are traditionally managed by women and children in Cham and Khmer households alike. The project aligns with female-headed household empowerment goals.

2.2 Cons

Disadvantage	Explanation
Moderate parasite burden	Barber pole worm, liver fluke, and coccidiosis are present during the rainy season, though at markedly lower levels than in high-rainfall jungle systems (see Section 3.2).
Seasonal flood risk	The Mekong flood pulse (July–October) can submerge low-lying paddy and house-lot ground for weeks. Ground-level shelters and un-elevated pens risk drowning or scattering the herd.
Predation risk — dogs	Feral and free-roaming village dogs are a leading predator of goats in rural Cambodia. Kids are especially vulnerable to night attacks and daytime pack harassment.
Crop-conflict risk	Goats that stray onto actively planted rice paddies cause crop damage and can create disputes between neighboring households. Grazing must be confined to dikes, stubble, fallow land, and common grassland.
Require constant observation	Goats cannot be left unattended. They escape tethering, wander onto planted rice, and are vulnerable to bloat, predation, and heat stress without active monitoring.
Need managed grazing rotation	Overgrazing a single dike or lake-grass patch strips vegetation within 2–3 days. Families must rotate tethering points or pen access regularly, and follow the rice-cropping calendar to avoid planted fields.
Shelter-dependent during flood season	Unlike cattle, which can be moved to higher ground, goats need dry, elevated housing that keeps them above flood water during the July–October flood pulse.
Vaccination and deworming burden	Goats require more frequent health intervention than cattle: periodic deworming, annual enterotoxemia (CD&T) vaccination, and regular hoof trimming.
Market volatility	Goat meat demand is seasonal, peaking around Khmer New Year, Pchum Ben, and — in Cham communities — Eid al-Adha, when demand and prices for live goats rise sharply. Prices can fluctuate \$2.50–\$4.00/kg live weight seasonally.
Tethering hazards	Tethered goats can wrap themselves in rope, flip, bloat, and die if not checked frequently. Tethering also limits grazing access to a small radius.
Agrochemical residue risk	Rice paddies in the area are periodically treated with pesticide and herbicide. Goats must not graze paddy dikes or stubble within the label re-entry interval after chemical application.

Net assessment: Goats remain a high-management asset in Chankiek, but the management burden shifts. Where Phnom Samkos forest systems demand constant vigilance against barber pole worm, Chankiek demands vigilance around flood timing, crop calendars, and dog predation. Families unwilling or unable to provide 2–3 hours of daily goat management, and to move animals during flood season, should not enter the program.

3. The Chankiek Environment — Goat-Specific Conditions

3.1 Precipitation, Flood Pulse & Seasonality

Parameter	Value	Impact on Goats
Annual rainfall	1,400–1,600 mm	Moderate compared to Cambodia's mountain forests; concentrated in a single wet season rather than year-round.
Rainy season	May–October (6 months)	Rice cultivation season. Paddy grazing restricted; goats rely on dikes, fallow land, and cut-and-carry fodder.
Mekong flood pulse	Peak Aug–Oct	River and seasonal lake rise; low-lying ground and pens can flood 0.5–2 m in a normal year, more in high-water years. Elevated housing is essential.
Dry season	November–April (6 months)	Rice stubble available after harvest (Nov–Dec); seasonal lake recedes, exposing extensive grassland for grazing through April.
Relative humidity	65–85%, seasonally variable	Lower and more variable than closed-canopy forest; less favorable to fungal skin conditions and parasite egg survival.
Temperature	27–34°C average, hotter Mar–Apr	Heat stress risk in the hot dry season; shade and ventilation still required.

Key design implication: in Chankiek, elevated housing is driven primarily by flood protection rather than chronic wet-season mud. An elevated platform (minimum 1.5 m, target 1.8 m) with a slatted / gapped floor keeps goats above documented flood high-water marks in a normal flood year, above mud and manure, and allows urine and pellets to fall through for collection. The same design also delivers the parasite-suppression and airflow benefits described below.

3.2 Barber Pole Worm (*Haemonchus contortus*) — A Reduced but Present Risk

The barber pole worm is a blood-sucking gastrointestinal nematode and remains the most significant internal parasite risk to goats in Cambodia generally. However, Chankiek's climate and grazing environment are substantially less favorable to the parasite than the high-rainfall forest systems where GSO's other goat programs operate.

Stage	Duration	Conditions in Chankiek
Eggs passed in feces	—	Continuous during the rainy season; a single female worm lays 5,000–10,000 eggs/day.
Egg hatching to L1	2–3 days	Slower than in closed-canopy jungle due to greater sun exposure and lower ambient humidity on open dikes and grassland.
L1 to infective L3	5–8 days	Moderate pace; direct sunlight on open paddy dikes and lake grassland slows larval development compared to shaded jungle understory.
L3 larva survival on pasture	7–14 days in dry season; 20–30 days in wet season	UV exposure and desiccation on open, sun-exposed grass kill larvae far faster than in shaded jungle systems (30–60 day survival).
Ingestion by goat	—	Larvae climb a few centimeters up grass blades in morning dew; risk is concentrated in the wet season and largely absent during the long dry season.
Pre-patent period	18–21 days	Consistent with the species generally; anemia can still develop in unmanaged animals during the rainy season.

Why Chankiek Is a Lower-Risk Zone Compared to Forest Systems:

1. Long, pronounced dry season: Six consecutive months (November–April) with little to no rain, combined with direct sun on open grassland, create an extended period each year during which infective larvae cannot

survive on pasture. Forest systems in Cambodia's mountain zones lack this reliable annual break.

2. Open, sun-exposed grazing: Paddy dikes, stubble fields, and seasonal-lake grassland lack the closed canopy that shields larvae from UV light and desiccation in jungle understory, so larval survival windows are roughly a third to half as long.

3. Grazing height: Goats browsing dike grass and stubble encounter fewer larvae per bite than jungle-understory browsers, since larvae concentrate in the lowest few centimeters of vegetation and open grass turns over faster.

4. Lower overall rainfall: At 1,400–1,600 mm annually — roughly half of the 3,000–4,000 mm recorded in Cambodia's high-rainfall forest zones — soil and vegetation moisture favorable to egg and larval survival is present for a shorter portion of the year.

5. Field estimate: Based on these conditions, unmanaged kid mortality attributable to barber pole worm in Chankiek is estimated at 5–10%, versus 30–50% documented in tropical high-rainfall jungle systems.

Chankiek Parasite Control Program (Lighter-Touch, Seasonal Focus)

Pillar	Action	Frequency	Cost (USD/year/doe)
1. Elevated housing + slatted floors	Keeps goats above manure, mud, and flood water; pellets fall through gaps for collection; breaks re-infection cycle.	Continuous	Built into shelter
2. Grazing rotation	Rotate dikes / stubble sections every 3–5 days during the rainy season to prevent larval accumulation; largely unnecessary in the dry season.	Wet season only	\$0 (labor)
3. FAMACHA monitoring	Check eyelid color to identify anemic individuals; treat selectively rather than deworming the whole herd.	Monthly (wet season); quarterly (dry season)	\$0–\$2
4. Strategic deworming	Deworm only FAMACHA-positive animals; rotate anthelmintic classes to slow resistance.	As needed (selective)	\$2–\$4
5. Dry-season pasture rest	The natural 6-month dry season already suppresses larvae; formal rest periods are optional and mainly used for stubble and dike regrowth management.	Seasonal	\$0

Critical note: Because Chankiek's baseline parasite risk is already moderate, blanket monthly deworming is unnecessary and accelerates anthelmintic resistance without a corresponding health benefit. GSO trains families on selective, FAMACHA-guided treatment focused on the rainy season, when risk is highest.

3.3 Feral & Free-Roaming Dog Predation

Dog attacks are the leading predation threat to goats in Chankiek, as in most rural Cambodian villages. Because Chankiek is a settled agricultural village rather than a wildlife-sanctuary buffer zone, the wild-predator risk present in forest programs does not apply here — the dominant risk is village and free-roaming dogs.

Dog Category	Behavior	Risk Level
Feral village dogs	Semi-wild, pack-forming, hunt at dawn/dusk	High — pack attacks on kids and weak adults
Free-roaming owned dogs	Unsupervised, territorial, chase and harass	Moderate–High — stress-induced abortion, kid separation, injury
Hunting dogs	Trained to hunt small game; may target goats	Low–Moderate — typically single-

Dog Category	Behavior	Risk Level
	when game is scarce	dog, opportunistic

Dog Attack Patterns

- Time: 80% of attacks occur between 04:00–07:00 (dawn) and 18:00–21:00 (dusk).
- Target: Kids under 3 months are the primary target. Pregnant does and weak adults are secondary.
- Method: Pack harassment → separation from herd → chase to exhaustion → throat/abdomen bite.
- Stress impact: Even unsuccessful attacks cause abortion in pregnant does, reduced milk production, and self-injury.

Dog Attack Prevention Strategy

Measure	Implementation	Cost
Night pen / dog-proof lock-up	All goats locked in elevated chain-link pen from 18:00–07:00. Pen has 1.8 m chain-link walls with 30 cm underground skirt to prevent digging.	Built into shelter
Family house proximity	Shelter located within 20 m of family house. Goats are less likely to be attacked near human activity and light.	\$0
Tethering supervision	If tethered during the day, goats must be within sight and hearing of a family member. Never tether out of sight.	\$0 (labor)
Community dog management	Work with the village chief and Cham community leaders to encourage dog vaccination, registration, and nighttime confinement of owned dogs.	\$0 (advocacy)
Kid protection	Kids kept in a separate, smaller elevated "kid pen" with 12 mm mesh until 3 months old.	Built into shelter
Noise deterrents	Tin cans, bells, or motion-activated alarms on pen perimeter.	\$5–\$15

Design note: The GSO shelter specification includes chain-link fencing on all four sides of the elevated platform, not just a roof and posts. The 1.8 m platform height provides dog protection as well as flood protection: dogs struggle to reach goats at this elevation, and the same height clears normal-year flood peaks.

3.4 Grazing & Browse Management — Paddy, Stubble & Lake Grassland

Goats in Chankiek are managed as combined grazers and browsers, drawing on three complementary feed sources tied to the rice-cropping and flood calendar:

Feed Source	Availability Window	Notes
Paddy dikes & field margins	Year-round, avoiding actively planted paddies	Primary daily grazing source; grass and legumes along raised dike paths between fields.
Post-harvest rice stubble	November–December (immediately after harvest), extending through the dry season	Major dry-season feed source at no cost; requires landowner permission if grazing outside the family's own plot.
Seasonal lake grassland	November–April, as the lake recedes	Large open grazing commons exposed as water level drops; requires coordination on shared / common access.
Cut-and-carry fodder trees & shrubs	Year-round	Leucaena, Gliricidia, Moringa, and banana leaves/pseudostem cut from field margins and homestead

Feed Source	Availability Window	Notes
		trees for supplemental feeding, especially during the wet-season planting window when dike grazing is restricted.
Crop residues	Seasonal, tied to harvest	Rice straw, maize stover, and peanut haulm as low-protein roughage filler.

Grazing Rotation Protocol

Period	Action	Rationale
Rice-growing season (May–Oct)	Confine goats to dikes, fallow land, and cut-and-carry fodder; never allow access to planted paddies.	Prevents crop damage and community conflict; also the period of highest parasite risk, so rotate dike sections every 3–5 days.
Harvest & stubble season (Nov–Dec)	Move goats onto the family's own harvested paddy to graze stubble.	Free, abundant feed; grazing pressure spreads naturally across the wide stubble area, limiting parasite buildup.
Dry season (Jan–Apr)	Graze the receding seasonal lake grassland and remaining stubble; supplement with cut-and-carry as grass thins toward April.	Long dry season and open exposure suppress parasite larvae; lake grassland provides the largest single dry-season feed source.
Flood pulse (Aug–Oct)	Move goats to the elevated shelter full-time as water rises; suspend ground grazing on submerged or waterlogged ground.	Prevents drowning, footrot, and displacement; also the period when parasite risk from wet ground is highest.

Labor implication: A family with 3–5 goats dedicates roughly 1.5–2.5 hours/day to grazing management — supervising dike or lake-grass grazing, cutting supplemental fodder, and moving tethers — plus 0.5–1.0 hour/day for pen cleaning, feeding, and health checks. During the flood pulse this shifts toward shelter-based feeding and reduced free grazing.

4. Shelter Specification — Three Budget Tiers

All three shelter designs share the following non-negotiable features for the Chankiek floodplain environment. Where the equivalent GSO forest-zone design elevates housing chiefly against chronic rain and mud, the Chankiek design elevates chiefly against the annual Mekong flood pulse, while retaining the same dog-proofing, hygiene, and parasite-break benefits.

Feature	Specification	Rationale
Elevation	1.8 m above ground (platform height)	Clears normal-year Mekong flood peak; dog-proof; manure collection; airflow.
Floor type	Slatted / gapped floor (25–35 mm gaps between slats)	Pellets and urine fall through; goats stay dry above flood water and mud.
Roof	Corrugated galvanized tin, minimum 15° pitch	Sheds monsoon rainfall; 15+ year lifespan.
Walls / fencing	Chain-link mesh (50 mm aperture), 1.8 m height	Dog-proof; goat-proof (goats climb bamboo); durable.
Shade wrap / mosquito netting	50% shade cloth or fine mesh (1–2 mm) on 2–3 sides	Reduces heat; blocks mosquitoes; windbreak during flood-season storms.
Posts	Treated hardwood or galvanized steel, set in concrete footings	Termite-resistant; flood-stable; 10+ year lifespan.
Manure collection	Concrete or compacted-earth pad under platform, sloped 1:20 for drainage	Collects pellets for easy scooping and application to rice paddies; prevents ground contamination.
Kid pen	Separate 1.0 m × 1.5 m elevated section	Protects kids from adult trampling and dog

Feature	Specification	Rationale
	with 12 mm mesh	access.
Feed tray	Elevated 60 cm above platform, slatted base	Prevents ground contamination of supplemental feed.
Water point	20 L hanging bucket or nipple drinker, elevated 80 cm	Clean water; no ground contamination.

4.1 Small Shelter — \$1,000 Budget

Capacity: 3–5 adult does + 1 buck + kids

Component	Specification	Qty	Unit Cost (USD)	Total (USD)
Platform frame	Treated hardwood posts (10 cm × 10 cm), 2.0 m length, set 60 cm in concrete	9	\$8	\$72
Platform decking	Bamboo slats (50 mm wide, 30 mm gaps), treated with used motor oil	1 set	\$45	\$45
Roof frame	Hardwood purlins (5 cm × 7 cm) on 60 cm centers	1 set	\$25	\$25
Tin roofing	Corrugated galvanized tin, 0.4 mm, 3.0 m × 6.0 m coverage, with ridge cap	1 set	\$85	\$85
Chain-link fencing	50 mm mesh, 1.8 m height, 12 m total length	12 m	\$4/m	\$48
Shade cloth / mosquito mesh	50% shade cloth on 2 sides	1 set	\$35	\$35
Stairs / ramp	Bamboo ramp with cleats, 30° angle	1	\$20	\$20
Kid pen	1.0 m × 1.5 m, 12 mm mesh, bamboo floor	1	\$35	\$35
Feed tray & water bucket	Elevated slatted tray + 20 L hanging bucket	1 set	\$18	\$18
Manure pad	Compacted earth + gravel, 3.0 m × 4.0 m, sloped for drainage	1	\$60	\$60
Hardware	Galvanized wire, U-bolts, screws, latches, padlock	1 set	\$35	\$35
Labor	Community crew (2 people, 3 days)	1	\$90	\$90
Contingency	10% buffer	—	—	\$55
			TOTAL	\$1,000 (approx.)

Dimensions: 3.0 m (width) × 4.0 m (length) × 1.8 m (platform height)

Pros: Lowest entry cost; buildable with hand tools and locally sourced bamboo; sufficient flood clearance for a normal-year Mekong flood pulse.

Cons: Bamboo floor and earth manure pad have a shorter lifespan (5–7 years) and require more frequent maintenance, especially after high-water years.

4.2 Medium Shelter — \$2,000 Budget

Capacity: 8–12 adult does + 2 bucks + kids

Component	Specification	Qty	Unit Cost (USD)	Total (USD)
Platform frame	Treated hardwood posts (12 cm × 12 cm) with steel corner brackets, set in concrete	12	\$12	\$144

Component	Specification	Qty	Unit Cost (USD)	Total (USD)
Platform decking	Hardwood slats (55 mm wide, 25 mm gaps), treated, with hardwood bearers	1 set	\$130	\$130
Roof frame	Hardwood purlins on 50 cm centers, braced	1 set	\$55	\$55
Tin roofing	Corrugated galvanized tin, 0.45 mm, 4.5 m × 6.0 m coverage, ridge cap + gutter	1 set	\$150	\$150
Chain-link fencing	50 mm mesh, 1.8 m height, 21 m total length	21 m	\$4/m	\$84
Shade cloth / mosquito mesh	50% shade cloth on 3 sides + fine mesh on 1 side	1 set	\$55	\$55
Stairs / ramp	Hardwood ramp with cleats and handrail, 32° angle	1	\$45	\$45
Kid pen	1.5 m × 2.0 m, 12 mm mesh, hardwood floor	1	\$60	\$60
Buck pen	1.5 m × 1.5 m, 50 mm mesh, solid partition	1	\$50	\$50
Feed trays	Elevated slatted trays, 2 units	2	\$18	\$36
Water system	40 L elevated tank + 2 nipple drinkers	1 set	\$60	\$60
Manure pad	Concrete pad (50 mm), 5.0 m × 7.0 m, sloped to collection gutter	1	\$120	\$120
Hardware	Galvanized wire, U-bolts, screws, latches, padlock	1 set	\$55	\$55
Labor	Community crew + skilled carpenter (3 people, 5 days)	1	\$180	\$180
Contingency	10% buffer	—	—	\$110
			TOTAL	\$2,000 (approx.)

Dimensions: 4.5 m (width) × 6.0 m (length) × 1.8 m (platform height) × 2.6 m (ridge height)

Pros: Separate buck and kid pens; concrete manure pad usable through the flood pulse; longer-lasting hardwood floor; water nipple system reduces labor.

Cons: Higher initial investment; requires skilled carpenter for concrete work.

4.3 Large Shelter — \$3,000 Budget

Capacity: 15–20 adult does + 3 bucks + kids + communal kidding bay

Component	Specification	Qty	Unit Cost (USD)	Total (USD)
Platform frame	Galvanized steel posts (75 mm × 75 mm RHS) + hardwood beams, set in concrete	16	\$18	\$288
Platform decking	Hardwood slats (60 mm wide, 25 mm gaps), treated, with 100 mm hardwood bearers	1 set	\$220	\$220
Roof frame	Galvanized steel purlins + hardwood rafters, bolted connections	1 set	\$120	\$120
Tin roofing	Corrugated galvanized tin, 0.5 mm, 6.0 m × 9.0 m coverage, ridge cap, gutters, downpipe	1 set	\$220	\$220
Chain-link fencing	50 mm mesh, 1.8 m height, 32 m total length, with gate	32 m	\$4/m	\$128
Shade cloth + mosquito	50% shade cloth on all 4 sides (roll-up),	1 set	\$80	\$80

Component	Specification	Qty	Unit Cost (USD)	Total (USD)
mesh	fine mesh on 2 sides			
Stairs / ramp	Galvanized steel ramp with hardwood treads, 35° angle, handrail	1	\$65	\$65
Kid pen (2 bays)	2.5 m × 3.0 m each, 12 mm mesh, hardwood floor	2	\$90	\$180
Buck pen (2 bays)	2.0 m × 2.5 m each, 50 mm mesh, solid partitions	2	\$70	\$140
Communal kidding bay	3.0 m × 3.0 m, solid floor (no gaps), heat lamp mount, observation window	1	\$120	\$120
Feed tray	Galvanized steel elevated tray, 1.5 m × 0.6 m, 3 units	3	\$20	\$60
Water system	100 L elevated tank with 5 nipple drinkers, gravity-fed	1 set	\$65	\$65
Manure pad + collection	Concrete pad (75 mm), 7.0 m × 10.0 m, sloped to central gutter, with 1,000 L collection pit	1	\$220	\$220
Storage locker	1.0 m × 0.8 m × 1.0 m lockable box under platform for feed / medicine	1	\$35	\$35
Hardware	Galvanized fittings, padlocks, hinges, wire, bolts	1 set	\$85	\$85
Labor	Community crew + skilled builder + steelworker (4 people, 7 days)	1	\$280	\$280
Contingency	10% buffer	—	—	\$160
			TOTAL	\$3,000 (approx.)

Dimensions: 6.0 m (width) × 9.0 m (length) × 1.8 m (platform height) × 2.8 m (ridge height)

Pros: Commercial-scale capacity; steel frame withstands flood-season damp and termites; communal kidding bay for assisted births; centralized manure collection for rice-field application; storage locker protects feed and medicine from flood and humidity.

Cons: Highest initial cost; requires steel cutting and welding skills (or a pre-fabricated frame from Kampong Cham town); longer build time.

4.4 Shelter Comparison Summary

Feature	Small (\$1,000)	Medium (\$2,000)	Large (\$3,000)
Capacity	3–5 does + 1 buck	8–12 does + 2 bucks	15–20 does + 3 bucks
Platform area	12 m ²	27 m ²	54 m ²
Floor material	Bamboo slats	Hardwood slats	Hardwood + steel bearers
Post material	Hardwood	Hardwood + steel brackets	Galvanized steel RHS
Roof pitch	15°	15°	20°
Manure pad	Earth + gravel	50 mm concrete	75 mm concrete + collection pit
Kid pen	1 small bay	1 medium bay	2 bays + communal kidding
Buck pen	None (shared)	1 bay	2 bays
Water system	Hanging bucket	40 L tank + nipples	100 L tank + 5 nipples
Flood clearance (platform)	1.8 m	1.8 m	1.8 m
Build time	3 days	5 days	7 days
Crew size	2 people	3 people	4 people
Lifespan	5–7 years	10–12 years	15+ years

5. Animal Specification & Sourcing

5.1 Recommended Breeds

Breed	Origin	Mature Weight	Pros for Chankiek	Cons
Indigenous lowland Cambodian goat	Local	20–30 kg	Highly adapted to paddy/floodplain grazing; heat-tolerant; low input; widely available in the Kampong Cham / Kratie region	Small size; slower growth; lower milk
Boer × local cross	South Africa × local	30–45 kg	Fast growth; good meat yield for the seasonal Eid al-Adha and Khmer New Year markets	Higher feed demand; slightly more susceptible to parasites than pure local
Anglo-Nubian × local	Britain × local	35–50 kg	High milk yield (2–3 L/day); large frame; good temperament	Very high feed demand; heat-sensitive; not recommended for first-time keepers

GSO Recommendation: Start with indigenous lowland does (80% of herd) and introduce one Boer-cross buck for genetic improvement. This maintains hardiness while improving kid growth rates and market weight ahead of festival demand periods. Avoid pure dairy breeds (Nubian, Saanen) in the first 2 years.

5.2 Sourcing Criteria

Check	Standard
Age	Does: 12–24 months (proven fertile preferred); Buck: 18–30 months
Body condition	Score 2.5–3.0 / 5 (ribs faintly visible; good hip cover)
Health	Bright eyes; clean nose; no diarrhea; no external parasites; firm hooves
Reproduction	Doe: confirmed pregnant or has kidded before; Buck: proven fertility
Vaccination	CD&T (enterotoxemia) at minimum; dewormed within 30 days
Source	Kampong Cham, Kratie, or Kampong Chhnang livestock markets, including Cham livestock traders active along the Mekong; avoid Phnom Penh (transport stress)
Slaughter / halal considerations	Families intending to sell for the Cham Eid market should confirm halal-compliant handling and slaughter arrangements with a local Cham butcher or Imam in advance

5.3 Starter Flock Composition

Flock Size	Does	Buck	Kids Expected (Year 1)	Total Cost (Animals)
Small	3	1	3–6	\$320–\$500
Medium	8	2	8–16	\$800–\$1,200
Large	15	3	15–30	\$1,500–\$2,250

Note: Buck-to-doe ratio of 1:15–20 for natural service. Bucks must be rotated every 18 months to prevent inbreeding.

6. Daily Management Protocol

6.1 Daily Schedule (Per Family)

Time	Task	Duration	Notes
06:00	Open pen; visual health check; FAMACHA scan if due (wet season)	15 min	Check for overnight dog signs, diarrhea, limping
06:30	Move goats to dike / stubble / lake-grass grazing spot; provide cut-and-carry if planted season	30 min	Confirm no access to planted rice paddies
08:00–11:00	Family works fields / fishing / market; goats graze under periodic check	—	Check every 60–90 min for entanglement, distress, straying into crops
11:00	Midday water check; move tether if spot depleted	15 min	Hot season: provide shade break
12:00–15:00	Goats rest in shade; family continues other work	—	Hottest part of day; goats should not be in direct sun
15:00	Move to afternoon grazing spot; fresh cut-and-carry	20 min	—
17:30	Return goats to elevated pen; feed tray topped up; water refreshed	20 min	Critical: all goats penned before dusk dog-activity window
18:00–19:00	Final headcount; pen locked; noise deterrents checked	15 min	Kids confirmed in kid pen

6.2 Flood-Season Adjustments (Aug–Oct)

- As water rises, transition goats to full-time shelter feeding with cut-and-carry fodder and stored crop residue rather than ground grazing on waterlogged or submerged land.
- Pre-position 1–2 weeks of stored fodder (dried rice straw, cut fodder-tree branches) before peak flood, based on prior-year high-water timing.
- Check platform and post stability after any flood surge; re-secure fencing skirts if soil around footings has eroded.
- Monitor for footrot and skin conditions associated with prolonged dampness once water recedes and grazing resumes.

7. Health Monitoring & Parasite Control

7.1 Health Monitoring Checklist

- Daily: eyes, gait, appetite, manure consistency, udder condition (lactating does).
- Weekly (wet season) / Bi-weekly (dry season): FAMACHA eyelid scoring for all animals over 3 months.
- Monthly: body condition scoring; hoof inspection; weight tracking for kids.
- After any flood event: full-herd check for footrot, skin lesions, and stress-related illness.

7.2 Parasite Control Calendar

Month	Action	Target
Jan–Feb (Cool/hot dry, lake grassland)	Fecal egg count (FEC) spot-check; deworm only if >500 epg	All herd (light monitoring)
Mar–Apr (Hot dry, late lake grassland)	Pre-monsoon full deworm; hoof trim; breeding buck health check	All herd
May (Pre-monsoon / planting begins)	Confirm paddy grazing restrictions with families; rest browse spots	Management
Jun–Jul (Rainy, dike grazing)	FAMACHA monthly; selective deworm	Anemic individuals

Month	Action	Target
Aug–Oct (Flood pulse)	Move to shelter-based feeding; monitor for footrot and flood-related stress	All herd
Nov (Harvest / stubble begins)	Post-flood FEC; deworm if >500 epg; transition to stubble grazing	All herd
Dec (Cool dry, breeding season)	Breeding season prep; buck health check; mineral supplement	Bucks + breeding does

7.3 Common Ailments in Chankiek

Ailment	Cause	Symptoms	Treatment	Prevention
Barber pole worm (Haemonchus)	Parasite (wet-season risk)	Pale eyelids, weakness, bottle jaw, dark diarrhea	Selective deworm + iron supplement	Elevated housing + FAMACHA + dry-season grazing pattern
Footrot	Bacteria (post-flood wet ground)	Lameness, foul-smelling hooves, swollen foot	Hoof trim + topical antibiotic spray	Elevated floor + dry bedding + regular hoof care after flood recession
Coccidiosis	Protozoa (kids)	Bloody diarrhea, dehydration, death	Amprolium or sulfa drugs	Clean kid pen + elevated floor + no ground feeding
Enterotoxemia	Bacteria (overeating, e.g. fresh stubble)	Sudden death, bloat, convulsions	Vaccination (prevention only)	CD&T vaccine + gradual diet changes when moving onto stubble
Mange / lice	External parasite	Hair loss, scratching, skin thickening	Ivermectin or topical dip	Regular inspection; isolate affected animals
Bloat	Gas accumulation (legume / fresh stubble overeating)	Distended left side, difficulty breathing, death	Vegetable oil drench + massage	Controlled fodder-tree and stubble access; gradual introduction
Dog attack trauma	Predation	Wounds, shock, abortion	Wound cleaning + antibiotics + tetanus	Night pen + dog-proof fencing
Flood-stress illness	Displacement, cold/wet exposure, feed disruption during flood pulse	Reduced appetite, lethargy, weight loss	Supportive care; supplemental feed; veterinary check if prolonged	Pre-positioned fodder stores + full-time shelter during peak flood

8. Reproduction & Breeding

8.1 Reproductive Parameters

Parameter	Indigenous Doe	Boer-Cross Doe
Age at first kidding	12–15 months	10–12 months
Kidding interval	8–10 months	7–8 months
Kids per birth	1.2–1.5	1.5–2.0
Gestation	145–155 days (≈ 5 months)	145–155 days
Kid birth weight	1.5–2.0 kg	2.0–3.0 kg
Weaning age	3 months	3 months
Weaning weight	6–8 kg	8–12 kg
Market weight	15–20 kg (6–8 months)	20–30 kg (5–7 months)

8.2 Breeding Calendar

Season	Activity	Rationale
Dec–Jan (Cool dry, post-harvest)	Main breeding season; expose does to buck	Kids born May–June, at the start of the wet season, when stored stubble and early dike growth are both available for the lactating doe
Apr–May (transition to wet)	Second breeding season (if does recover)	Kids born Sep–Oct, during the flood pulse — requires extra shelter-based care but allows a second annual cycle
Aug–Oct (Flood pulse)	Avoid new breeding where possible; separate buck	Family attention is focused on flood management; wet, crowded shelter conditions stress pregnant does

GSO recommends prioritizing the December–January breeding window so that kidding falls in the dry season, when stubble and lake grassland feed is abundant and the flood pulse is not yet underway.

8.3 Kidding Management

1. Pre-kidding: Move doe to communal kidding bay (solid floor, no gaps) 3–5 days before due date. Provide clean bedding (dry grass or rice straw).
2. Birth: Most kidding is unassisted. Be present for first-time kidders. Clean kid's nostrils and mouth immediately. Ensure kid nurses colostrum within 1 hour.
3. Post-kidding: Dip umbilical cord in iodine. Keep doe and kid in kidding bay for 3–5 days before returning to main pen.
4. Kid protection: Kids remain in the elevated kid pen (12 mm mesh) until 3 months old. They graze under supervision during the day but sleep in the kid pen at night.

9. Economics — Per-Doe Annual Model

9.1 Costs (USD per doe per year)

Item	Cost
Feed (cut-and-carry, crop residues)	\$0–\$15 (mostly family labor; stubble and lake grass are largely free)
Mineral block / salt	\$5–\$8
Deworming (selective, seasonal)	\$2–\$4
Vaccination (CD&T, PPR, FMD)	\$4–\$8
Veterinary reserve	\$3–\$6
Shelter amortization (Small, 7 years)	\$15–\$20
Labor (imputed)	\$0 (family)
Total annual cost per doe	\$29–\$61

9.2 Returns (USD per doe per year)

Item	Value
Kids produced (1.5 kids, 85% survival)	1.3 marketable kids
Kid sale value (18 kg @ \$3.50/kg, higher near Eid al-Adha)	\$63 per kid × 1.3 = \$82
Milk offtake (1 L/day × 120 days)	\$0.50/L = \$60 (household value)
Manure value (applied to rice paddy or sold)	\$15–\$25
Cull doe value (Year 5–6)	\$40–\$60 (one-time)
Total annual return per doe	\$95–\$165

9.3 Net Position

Metric	Value
Break-even	Year 1–2 (depending on kid survival)
Net annual profit per doe (Years 2–5)	\$66–\$135
Return on investment (doe + shelter share)	45–90% annually after Year 2 — modestly higher than the forest-zone model, reflecting lower veterinary and deworming costs

10. Implementation Phasing

Phase	Scope	Duration	Cost
Phase 0 — Site selection + community agreement	Identify household cohort in Chankiek Village, Sala Lek 5; map paddy dikes, stubble land, and seasonal-lake boundary; record prior-year flood high-water marks; establish Goat Committee with Cham community leadership; sign MOU; assess dog situation	2 weeks	\$0
Phase 1 — Training	2-day workshop: goat husbandry, FAMACHA, elevated housing construction, flood preparedness, dog protection, record keeping	3 days	\$10/person
Phase 2 — Shelter construction	Build selected shelter tier (Small/Medium/Large) using community labor + GSO materials grant; site above documented flood high-water mark	3–7 days	\$1,000–\$3,000
Phase 3 — Animal procurement	Source does and buck from Kampong Cham / Kratie / Kampong Chhnang markets; veterinary inspection; transport; quarantine for 14 days	2–3 weeks	\$320–\$2,250
Phase 4 — Breeding & kidding support	First breeding season timed for dry-season kidding; kidding supervision; kid pen management	Months 3–8	\$0 (GSO staff)
Phase 5 — Monitoring & scale-up	Quarterly visits; FAMACHA refresher; pre-flood shelter inspection; expansion planning	Months 9–24	\$0 (GSO advisory)

11. Bill of Materials — Shelter Tiers Summary

Item	Small (\$1,000)	Medium (\$2,000)	Large (\$3,000)
Capacity	3–5 does	8–12 does	15–20 does
Platform size	3 m × 4 m	4.5 m × 6 m	6 m × 9 m
Elevation	1.8 m	1.8 m	1.8 m
Floor	Bamboo slats, 30 mm gaps	Hardwood slats, 25 mm gaps	Hardwood slats, 25 mm gaps
Roof	Tin, 15° pitch	Tin, 15° pitch + gutter	Tin, 20° pitch + gutters
Fencing	Chain-link, 1.8 m	Chain-link, 1.8 m	Chain-link, 1.8 m + gate
Shade / mesh	2 sides shade cloth	3 sides shade + 1 side mesh	4 sides shade (roll-up) + mesh
Kid pen	1 small bay	1 medium bay	2 bays + communal kidding
Buck pen	Shared	1 bay	2 bays
Manure pad	Earth + gravel	50 mm concrete	75 mm concrete + pit
Water	Hanging buckets	40 L tank + nipples	100 L tank + 5 nipples
Build time	3 days	5 days	7 days
Lifespan	5–7 years	10–12 years	15+ years

12. Safety & Ecosystem Alignment

- Grazing zone restrictions: All goat grazing is restricted to paddy dikes, post-harvest stubble on the family's own or an agreed plot, fallow land, and the common seasonal-lake grassland. Goats must never access actively planted rice paddies.
- Seasonal lake / fish-nursery protection: The seasonal lake bordering Chankiek is an important dry-season nursery habitat for Mekong fish species as water recedes. Goat grazing on lake-margin grassland is permitted on exposed dry ground but must not disturb remaining shallow water or newly exposed wet mud where fish fry may be present, consistent with GSO's climate-resilience and fisheries-support work in the village.
- Manure for rice fields: Collected goat pellets are a high-value nitrogen source applied directly to the family's rice paddy, reducing chemical fertilizer demand and supporting soil health on repeatedly cropped land.
- Dog management coordination: GSO works with the village chief and Cham community leadership on humane dog population management, vaccination, and nighttime confinement. The goat program is not a justification for poisoning or shooting dogs.
- Flood preparedness: Shelter siting and platform elevation are set using documented prior-year flood high-water marks for Chankiek, reducing the need for emergency evacuation of the herd during the Mekong flood pulse.
- Cham community alignment: Program materials and slaughter-related guidance respect Cham halal practice; goat management responsibilities are recognized as primarily led by women and children within participating households, consistent with GSO's household-empowerment goals.

13. Revision & Contact

This is a planning-stage specification (Rev. 1.0) intended to guide pilot goat shelter construction across the first GSO household cohort in Chankiek Village, Sala Lek 5, Kampong Cham Province. Shelter costs, local material prices, flood high-water marks, and dog predation patterns should be validated on the ground before scaling to additional households or villages.

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