



**GLOBAL
STUDENT
OUTREACH**

TECHNICAL PROPOSAL

GSO Community Cow Bank Program

Pass-On Livestock Model for Rural Cambodia

Prepared for

GLOBAL STUDENT OUTREACH

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

Document Rev. 1.0 — January 18, 2013

Target Cost per Starter Cow Unit: USD \$300–\$600

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1. Executive Summary

This proposal defines a **Cow Bank (Pass-On Gift) Program** for Global Student Outreach (GSO) community sites in rural Cambodia. The model is adapted from proven pass-on-livestock development frameworks: a recipient household receives a pregnant heifer or mature cow on loan, agrees to raise the animal according to GSO veterinary and husbandry protocols, and — upon successful birth of the first female calf — passes that heifer on to a second, pre-qualified family in the same community. The original recipient retains all subsequent offspring and any male calves for income, meat, or draft use.

The program targets **Brahman-cross or locally adapted Zebu-type cows** ($\approx$ 250–350 kg mature weight) suited to Cambodia's tropical climate, limited pasture base, and smallholder labor constraints. Each starter cow unit is budgeted at approximately **USD \$800–\$1,200** (animal purchase, initial veterinary inputs, transport, and 12 months of supplemental feed/minerals). The program is designed to be **self-sustaining after the first generation** of pass-on events, with GSO support transitioning from asset provision to technical advisory.

This document covers program mechanics, biological parameters, land and labor requirements, input budgets, reproduction protocols, and a per-cow project data model suitable for grant proposals, field crew training, and community agreements.

2. How the Cow Bank Works

2.1 The Pass-On Gift Mechanism

Step	Action	Accountability
1. Selection	GSO and community committee select Recipient Family A based on need, land access, shelter readiness, and commitment.	GSO + Community Committee
2. Placement	Recipient Family A receives one pregnant heifer or mature cow (ideally confirmed pregnant or with calf-at-foot).	GSO Field Team
3. Contract	Signed agreement: family provides daily care, shelter, and	Both parties

	reporting; GSO provides veterinary support, breeding services, and training for 24 months.	
4. First Birth	Cow calves. If the first viable offspring is female, it is designated the **Pass-On Heifer** .	Recipient Family A
5. Pass-On	When the Pass-On Heifer reaches ~18–24 months of age and is confirmed pregnant (via community AI or natural service), it is transferred to **Recipient Family B** .	Family A → Family B
6. Expansion	Family A retains all subsequent calves. Family B now enters the same contract. The chain continues.	Community Committee
7. Exit	After 24 months and successful pass-on, GSO transitions to advisory-only; the community committee manages the queue of new recipients.	Community Committee

2.2 Core Principles

****No cash repayment****: the “repayment” is the live female offspring, preserving household liquidity.

****Community ownership****: a village-level Cow Bank Committee (with gender-balanced representation) maintains the waiting list, mediates disputes, and enforces basic husbandry standards.

****Asset retention****: the original recipient keeps the cow and all later offspring — the program does not create a debt trap.

****Technical lock-in****: recipients must use GSO-approved breeding (AI or community bull), vaccination schedules, and record-keeping. This protects genetic quality and animal health across the chain.

3. System Overview — Key Design Parameters

Parameter	Specification	Notes
Target breed	Brahman × local Zebu crossbred cow; or hardy indigenous Cambodian cow	Heat-tolerant, tick-resistant, adapted to low-input grazing
Mature live weight	250–350 kg	Smaller frame = lower feed demand per day
Starter age at placement	24–36 months (confirmed pregnant or with first calf)	Maximizes immediate productivity; reduces time-to-pass-on
Working land per cow	0.5–1.0 ha improved pasture (cut-and-carry or rotational grazing)	Assumes native grazing plus planted forage; see Section 6
Daily labor per cow	1.5–2.5 hours/day (reduced to ~1.0 hr/day with planted forage)	Includes herding, cutting, watering, cleaning, milking if applicable
Gestation duration	278–283 days (≈ 9 months)	Bos indicus / crossbred median;

		range 270–295 days
First-service conception (AI)	55–65%	Crossbreeds generally higher than local zebu; see Section 8
Services per conception	1.2–1.6	Budget 1.5 straws/services per pregnancy for planning
Calving interval (target)	14–18 months (420–550 days)	14 mo achievable with good nutrition; 18 mo typical under smallholder constraints
Age at first calving (heifer)	30–36 months	For locally raised replacement heifers on village nutrition
Pass-on timeline	24–30 months from placement to transfer of first female offspring	Allows weaning, re-breeding, and pregnancy confirmation
Target mortality (calf to weaning)	< 10%	Achievable with basic vaccination, shelter, and dry-season feed
Milk offtake (optional)	1–3 L/day during lactation	Not primary objective; incidental benefit for household nutrition

4. Animal Specification & Sourcing

4.1 Breed Profile

Recommended: Brahman × local Zebu (*Bos indicus*) F1 or F2 cross.

****Advantages for Cambodia:****

High heat and humidity tolerance (sweat gland density, sleek coat)

Natural resistance to tropical ticks and tick-borne diseases (*Theileria*, babesiosis)

Efficient on low-quality roughage and crop residues

Docile temperament suitable for smallholders with limited handling facilities

Good mothering ability on extensive systems

****Alternative:**** Pure indigenous Cambodian cow (smaller, 200–250 kg, lower daily gain but extremely hardy and low input)

4.2 Sourcing Criteria

Check	Standard
Age	2.5–4 years (dentition check: 6–8 permanent incisors)
Body condition score	Minimum 2.5 / 5 (hip bones visible but not sharp; some rib cover)
Pregnancy status	Preferably confirmed pregnant (3–7 months) by rectal palpation or proven fertile with calf-at-foot
Health	No chronic cough, no severe lameness, no ocular/nasal discharge, free of external parasites
Vaccination history	Minimum: FMD (foot-and-mouth), HS (hemorrhagic septicemia), blackleg — verified or administered at purchase
Horn status	Polled or dehorned preferred for community safety

5. Inputs — Annual Requirements Per Cow

5.1 Feed & Nutrition

Cambodian smallholder cattle are traditionally raised on native grazing, rice straw, and cut-and-carry grasses. The Cow Bank program **requires improved forage establishment** to meet the reproductive targets above and to keep daily labor below 3 hours.

Input	Annual Quantity	Purpose
Grazing / native pasture	0.3–0.5 ha continuous access	Baseline dry-season and rainy-season grazing
Planted forage (cut-and-carry)	500–800 m ² plot of *Brachiaria* sp., *Panicum maximum*, or *Pennisetum purpureum* (Napier)	High-yield dry-season feed; reduces labor by ~2 hrs/day
Rice straw / crop residues	300–500 kg (dry season supplement)	Roughage filler when pasture is scarce
Concentrate / by-product	50–100 kg (palm kernel cake, rice bran, or molasses-urea block)	Flushing before breeding; late-pregnancy / early-lactation boost
Mineral mix / salt lick	15–20 kg	Phosphorus and trace-element supplementation critical on Cambodian sandy soils
Water	25–50 L/day (lactating: up to 60 L/day)	Clean, shaded water point within 200 m of shelter

5.2 Veterinary & Breeding Inputs

Input	Frequency	Annual Cost (USD est.)
FMD vaccine	Every 6 months	\$4–\$6
HS + blackleg vaccine	Annual booster	\$3–\$5
Deworming (broad-spectrum)	Every 3–4 months	\$4–\$6
Tick control (pour-on or dip)	Weekly in wet season, bi-weekly in dry	\$6–\$10
AI service (frozen semen + technician)	Per insemination; 1.5 services per conception budgeted	\$8–\$12 per service
Pregnancy diagnosis (rectal palpation)	Per check	\$3–\$5
Emergency veterinary kit	As needed	\$10–\$15 reserve
Subtotal — Veterinary / Breeding		**\$50–\$80 / year**

5.3 Infrastructure Inputs (One-Time, Per Cow Unit)

Item	Specification	Estimated Cost (USD)
Shelter / shed	3 m × 2.5 m open-sided pole shed, thatch or tin roof, elevated slatted or compacted earth floor	\$60–\$100
Fencing	0.5 ha split-bamboo or live-fence perimeter; or tethering stake with swivel	\$20–\$40
Forage plot establishment	Cuttings / seed, initial labor, 500	\$15–\$25

	m ²	
Water trough	50–100 L GI drum or concrete trough	\$10–\$20
Feed rack / manger	Bamboo or timber construction	\$5–\$10
Tether / halter / rope	Nylon or sisal	\$3–\$5
Subtotal — Infrastructure		**\$110–\$200**

6. Land & Housing Requirements

6.1 Land Required Per Cow

The land budget depends heavily on **pasture quality** and **management intensity**:

System	Land per Cow	Carrying Capacity	Suitability for GSO Sites
Native grazing only (unimproved)	1.5–2.0 ha	0.5–0.7 AU/ha	High labor; seasonal weight loss; long calving intervals
Native grazing + cut-and-carry forage	0.8–1.2 ha pasture + 500 m ² planted forage	~1.0 AU/ha equivalent	**Recommended baseline** for Cow Bank
Improved pasture (fertilized/legume)	0.4–0.6 ha	1.5–2.5 AU/ha	Best case; requires capital and technical skill
Zero-grazing (cut-and-carry only)	1,000–1,500 m ² intensive forage	N/A	Very high labor; only if land is extremely scarce

GSO Planning Standard: budget **0.5–1.0 ha per cow** assuming a mix of native grazing and a small planted forage plot. This aligns with typical smallholder landholdings in NW Cambodia (2–4 ha per household), allowing a family to hold 2–3 cows without displacing food crops.

6.2 Housing / Shelter Specification

****Location:**** well-drained ground, elevated above flood line, shaded by trees or roofed

****Dimensions:**** minimum 3 m (length) × 2.5 m (width) × 2.2 m (ridge height) per cow

****Orientation:**** long axis east–west to minimize sun exposure; open to prevailing breeze

****Floor:**** compacted earth with 100 mm sand/gravel base, sloped 1:20 for drainage; or slatted bamboo (preferred for hygiene)

****Roof:**** thatch, palm leaf, or corrugated tin on timber poles; must shed monsoon rain

****Yard / loafing area:**** optional 4 m × 4 m fenced area for exercise and dung collection

7. Time & Labor Budget

7.1 Daily Hours Per Cow

Traditional Cambodian smallholder cattle management is **highly labor-intensive** when dependent on distant grazing and hand-collected fodder. The Cow Bank program targets labor reduction through planted forage.

Activity	Traditional System (hrs/day)	With Planted Forage (hrs/day)
Herding / grazing supervision	2.0–4.5	0.5–1.0 (reduced herding distance)
Grass cutting / carrying	1.5–3.0	0.5–1.0 (plot adjacent to house)
Watering	0.3–0.5	0.3–0.5
Shelter cleaning / dung collection	0.2–0.3	0.2–0.3
Feeding supplements / minerals	0.1	0.1
Health observation / record keeping	0.1	0.1
Total daily labor per cow	**4.0–8.5 hrs**	**1.5–2.5 hrs**

*****Key design note:**** Planted forage can reduce household cattle labor by ****2–7 hours per day****, freeing time for education, off-farm income, or aquaponics/aquaculture work (as referenced in the GSO tank specification). This is a major co-benefit of the Cow Bank program.*

7.2 Seasonal Labor Peaks

Period	Extra Tasks	Added Hours
Dry season (Nov–Apr)	Increased cut-and-carry; water hauling; tick control intensifies	+0.5–1.0 hr/day
Calving (per event)	Night watch; colostrum management; calf docking / navel dip	+2–4 hrs/day for 3–5 days
Breeding (AI round)	Heat detection; holding cow for technician; record entry	+1–2 hrs/day for 5–7 days
Forage establishment	Plot preparation; planting; first-month watering	+10–15 hrs one-time

8. Reproduction & Breeding Protocol

8.1 Gestation Duration

Parameter	Value	Notes
Median gestation length	**278 days**	Range 270–295 days for Bos indicus crosses
Heifers (first calf)	Often 2–3 days longer than mature cows	Monitor closely around day 280
Twins	Rare (< 2%); usually singleton	No special provision required

8.2 Pregnancy Success Rates

The following are **realistic field targets** for Cambodia, based on tropical crossbred cattle under smallholder AI programs:

Metric	Target	Conservative	Source Context
**First-service	55–60%	50%	Crossbreeds outperform

conception (AI)**			local zebu by ~5–10 percentage points
Overall conception after 2–3 services	85–95%	80%	Most fertile cows conceive by third service
Services per conception (NSPC)	1.2–1.4	1.6	Budget 1.5 for semen ordering
Abortion / early embryonic loss	3–8%	10%	Higher in heat-stressed or mineral-deficient cows
Calving rate (of cows diagnosed pregnant)	90–95%	85%	Accounts for late-term abortion

***Breeding recommendation:** Use **fixed-time AI (FTAI)** with a simple Ovsynch or CIDR-Synch protocol where GSO can organize technician visits for 5–10 cows at once. This removes the dependency on heat detection (a major bottleneck in smallholder systems) and raises service rates close to 100%.*

8.3 Calving Interval Targets

Nutrition Level	Achievable Calving Interval	Days Open
Poor (native grazing only, no supplement)	20–24 months	180–240 days
Moderate (native grazing + forage + minerals)	16–18 months	120–160 days
Good (improved pasture + strategic supplement)	13–14 months	90–120 days

GSO Program Target: 16–18 months (480–550 days) as a realistic, cost-effective compromise that does not overload the household feed budget.

8.4 Replacement Heifer Timeline

Milestone	Age	Action
Birth	0 mo	Weigh; navel dip; ensure colostrum within 2 hrs
Weaning	6–8 mo	Separate from dam; introduce creep grazing / forage
Puberty	18–24 mo	First estrus observed; begin weight monitoring (target 220+ kg for breeding)
First breeding (AI)	24–30 mo	Synchronize; inseminate with proven beef or dual-purpose sire
First calving	33–39 mo	Monitor closely; assist if needed
Pass-On Transfer	42–48 mo	Heifer confirmed pregnant; transferred to Recipient Family B

9. Project Data Per Cow — 5-Year Model

The table below summarizes the expected biological and economic performance of **one starter cow** over a 5-year horizon under the Cow Bank pass-on model. Figures are planning-level estimates for grant budgeting and community expectation-setting.

Year	Event	Calf Born	Offspring Retained	Pass-On Event	Cumulative Calves for Family A	Notes
0	Cow placed (pregnant, 30 mo old)	—	—	—	—	GSO investment: cow + vet + feed
1	First calving (Month 3–6)	1	0	—	0	Calf = Pass-On Heifer (if female)
2	Second calving; Pass-On Heifer weaned & bred	1	0	**Heifer passed to Family B**	0	Family A now “debt-free”
3	Third calving	1	1	—	1	Family A keeps calf (sell or raise)
4	Fourth calving	1	1	—	2	Herd building or income generation
5	Fifth calving; cow culled or retained	1	1	—	3	5–6 year cow lifespan in program; cull if fertility drops

9.1 Biological Summary Per Starter Cow (5 Years)

Output	Quantity
Total calvings	4–5
Total live calves weaned	3–4 (assuming 10–15% mortality)
Pass-on heifers produced	1 (mandatory first female)
Calves retained by Family A	2–3
Calves sold / consumed by Family A	1–2 (males or excess females)

9.2 Estimated Economic Flow Per Starter Cow (USD)

Item	Cost / Revenue (5-yr total)
Initial asset value (cow)	\$500–\$700
Initial inputs (vet, transport, feed buffer)	\$150–\$250
Annual operating cost (vet, feed, minerals, AI)	\$60–\$100/yr × 5 = \$300–\$500
Infrastructure (shed, fence, trough)	\$110–\$200 (one-time)
Total 5-year program cost	**\$1,060–\$1,650**
Value of 2–3 retained calves (sold at 18–24 mo, 200–250 kg)	\$400–\$750
Value of draft power / manure for crops (imputed)	\$150–\$300
**Value of incidental milk (household	\$100–\$200

consumption)**	
Total 5-year household benefit	**\$650-\$1,250**
Net position at Year 5	Family A owns a mature cow + 1-2 young stock; break-even or positive depending on market timing

****Important:**** *The Cow Bank is ****not a rapid income generator**** — it is a ****asset-building and resilience program****. The primary return is a self-replicating herd that provides draft power, organic fertilizer, emergency liquidity (sale of a calf), and protein (milk/meat). Financial break-even for the household typically occurs in Year 3–4.*

10. Implementation Phasing

A single Cow Bank cohort (10–20 starter cows placed across 10–20 families) can be rolled out over **6 months**, with GSO field staff providing intensive support for the first 24 months.

Phase	Scope of Work	Duration	Responsible
Phase 0 — Site Selection & Community Agreement	Identify village; establish Cow Bank Committee; sign community MOU; assess pasture / water / shelter capacity of first 10 families.	2–4 weeks	GSO + Community Committee
Phase 1 — Recipient Training	2-day workshop: cattle husbandry, record keeping, forage planting, breeding calendar, pass-on contract signing.	3–5 days	GSO Field Team
Phase 2 — Animal Procurement & Placement	Source cows from provincial market or breeding station; veterinary inspection; transport; placement with pregnancy confirmation.	2–3 weeks	GSO + Local Vet
Phase 3 — Infrastructure & Forage Establishment	Families build / upgrade shelter; plant 500 m ² forage plot; install water point.	2–4 weeks	Families + GSO materials support
Phase 4 — First Breeding & Calving Support	AI technician visit (synchronized batch breeding); calving assistance; colostrum training.	Ongoing; first 12 months	GSO + Contract AI Tech
Phase 5 — Pass-On Execution	Identify Family B; prepare heifer; veterinary check; transfer ceremony; contract signing with Family B.	2–4 weeks (Month 24–30)	Community Committee + GSO
Phase 6 — Monitoring & Exit	Quarterly visits reduce to bi-annual; committee takes over queue management; GSO shifts to advisory.	Months 24–36	GSO (advisory)

11. Bill of Materials & Cost Summary — Per Starter Cow Unit

Category	Item	Qty	Unit Cost (USD)	Total (USD)
A. Animal Asset	Pregnant Brahman-cross heifer / cow (250–300 kg)	1	\$500–\$700	**\$500–\$700**
B. Initial Veterinary	Vaccination (FMD, HS, blackleg); deworming; tick treatment; pregnancy check	1 set	\$30–\$50	**\$30–\$50**
C. Transport	Truck / trailer from market to village (shared load)	1 share	\$20–\$40	**\$20–\$40**
D. Infrastructure	Shelter (bamboo/timber/t hatched); fence / tether; water trough; feed rack	1 set	\$110–\$200	**\$110–\$200**
E. Feed & Forage Establishment	Forage cuttings/seed; 50 kg concentrate; mineral block; rice straw reserve	1 set	\$40–\$70	**\$40–\$70**
F. 12-Month Operating Reserve	AI services (2 straws); deworming × 3; tick control; minerals; emergency vet	1 yr	\$60–\$100	**\$60–\$100**
G. GSO Field Support	Staff time, transport, training materials, record books (amortized per cow)	1 share	\$40–\$60	**\$40–\$60**
			TOTAL	**\$800–\$1,220**

Batch cost reduction: procuring 10+ cows simultaneously, sharing transport, and batching AI technician visits can reduce per-unit costs by **10–15%**.

12. Operations & Maintenance (Community-Level)

12.1 Routine Checks (Recipient Responsibilities)

Frequency	Task
Daily	Water check; visual health scan; tick count on legs/udder; dung removal from shelter
Weekly	Weight / condition score estimate; forage plot

	check; mineral block refill
Monthly	Record entry (heat dates, AI dates, body condition); fence / tether inspection
Quarterly	Deworming; thorough tick treatment; review with GSO field officer
Annually	FMD + HS booster; shelter repair; forage plot re-seed / expand

12.2 Record Keeping (Minimum Data)

Each recipient family maintains a **Cow Bank Passbook**:

1. Cow ID (ear tag number + photo)
2. Date of placement
3. Breeding dates (AI / natural service)
4. Pregnancy check results
5. Calving date, calf sex, birth weight
6. Vaccination and deworming log
7. Pass-on transfer date and recipient name
8. Death / sale / cull events with reason

12.3 Risk Mitigation

Risk	Mitigation
Theft	Community watch; night sheltering; ear tagging; committee insurance pool (optional)
Drought / feed shortage	Pre-positioned rice straw; communal forage reserve plot; early weaning protocol
Disease outbreak (FMD)	Strict 6-month vaccination; movement control; immediate reporting to district vet
Recipient default (sells cow, neglect)	Signed contract; committee monitoring; threat of community exclusion; GSO retains breeding records
Prolonged infertility	Cull protocol after 3 failed services; replace with new starter cow if GSO funds allow
Calf mortality	Colostrum protocol within 2 hrs; navel dip; shelter calving; dry-season mineral supplementation

13. Alignment with GSO Mission

The Cow Bank program integrates directly with existing GSO aquaponics and food-security work:

****Manure → aquaponics / grow beds:**** cattle dung is a potent organic fertilizer that can be composted and applied to vegetable beds or filtered into pond systems (as referenced in the GSO Tank Specification overflow-to-grow-bed design).

****Draft power:**** cows can be trained for light plowing and carting, reducing fossil-fuel dependency for land prep and water hauling.

****Labor synergy:**** reduced cattle labor (via planted forage) frees household time for aquaponics maintenance, education, or off-farm work.

****Gender equity:**** women often manage small livestock; the Cow Bank Committee mandate for female representation ensures women control the asset queue and pass-on decisions.

****Climate resilience:**** livestock provide a liquid asset (saleable calf) during crop-failure years, complementing the steady protein output of the aquaponics tank.

14. Revision & Contact

This is a planning-stage proposal (Rev. 1.0) intended to guide pilot Cow Bank design across the first GSO community cohort. Animal prices, AI service availability, and pasture carrying capacity should be validated locally in Battambang, Pursat, or Kampong Thom provinces before scaling.

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