HANSOME: Alpacas vs Cougars

GameFi Economic Model — Mathematical Analysis

Field	Value
Document	GameFi Economic Model (standalone analysis)
Project	HANSOME: Alpacas vs Cougars
Chain	Robinhood Chain
Game	https://game.hansomealpacas.xyz/
Version	1.0.0
Status	Analytical companion to GDS v1.1 / implemented contracts
Languages	English (this file) · Traditional Chinese (`HANSOME_GAME_ECONOMIC_MODEL_ZH.md`)

Disclaimer. This document explains the **implemented** daily emission and settlement mathematics. It does **not** promise profits, guaranteed yields, or fixed APYs. Outcomes depend on participation, skill, treasury health G, NFT identity (Alpaca / Cougar / traits), and market conditions for `$HANSOME` and NFTs. Nothing herein is investment advice.

Sources of truth (formulas): `EmissionController.sol`, `SettlementLib.sol`, `GameTypes.sol`, `GameTreasury.sol`, GDS v1.1. Token **supply** of `$HANSOME` (1,000,000,000 fixed) is unchanged by gameplay emission — rewards are paid from the **GameTreasury** balance, not minted.

Abstract

HANSOME is an asymmetric day-settled GameFi economy on Robinhood Chain. Each day a bounded reward pool R_d is drawn from GameTreasury spendable balance G. That pool is split into Alpaca, Cougar Base, and Hunting sub-pools. Players compete through Commit → Reveal → Settlement → Claim. Emission bands shrink R_d as G falls, protecting longevity. Penalties, dust, and empty-pool remainders return to the Treasury rather than leaking value. The design aims for **two-sided value**: active players earn contingent rewards and utility; the ecosystem retains a sustainable runway, engagement, and token utility without unlimited inflation.

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1. Game Economic Model — Daily Emission

1.1 Core relation

```
R_d = f(G)
```

where:

- G = GameTreasury **spendable** balance of `$HANSOME`

G = balance - outstandingClaims

- R_d = that day's **fixed** reward pool (whole tokens, 18 decimals on-chain)
- f is a **step function** of G relative to fixed reference G_0 (not a floating high-water mark)

1.2 Implemented parameters

Symbol	Value	Role
G_0	300,000,000 HANSOME	Band reference ("initial treasury" scale)
G_safe	15,000,000 HANSOME	Safe-mode threshold
R_0	400,000 HANSOME	Top-band daily pool

1.3 Emission bands (on-chain)

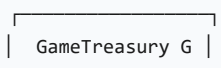
Condition	Daily pool R_d
G ≥ 0.70 G_0	400,000
0.40 G_0 ≤ G < 0.70 G_0	280,000
0.20 G_0 ≤ G < 0.40 G_0	160,000
G_safe ≤ G < 0.20 G_0	80,000
G < G_safe	0 (+ Commit paused in implementation)

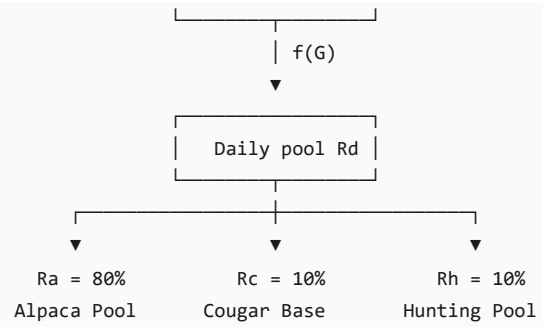
Numeric thresholds for G_0 = 300,000,000:

Band floor	G
0.70 G_0	210,000,000
0.40 G_0	120,000,000
0.20 G_0	60,000,000
G_safe	15,000,000

1.4 Mathematical purpose

1. **No unlimited emission** — R_d is capped per day and cannot grow with "demand" alone.
2. **Treasury longevity** — as G declines, R_d steps down, extending runway.
3. **Incentive preservation** — while G ≥ G_safe, a positive pool remains (until safe mode).
4. **No mint** — settlement never mints `$HANSOME`; it only **reserves** and later **transfers** from GameTreasury.





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2. Daily Reward Distribution Formula

2.1 Pool split (exact)

```
R_d^A = ⌊ R_d × 0.80 ⌋,
R_d^C = ⌊ R_d × 0.10 ⌋,
R_d^H = ⌊ R_d × 0.10 ⌋
```

```
splitDust = R_d - R_d^A - R_d^C - R_d^H
```

(`SettlementLib.splitDailyPool` — integer division; dust returns to Treasury via unallocated.)

2.2 Conceptual player reward

A useful pedagogical decomposition (maps to on-chain terms below):

```
Reward_i ≈ (R_pool · W_i / Σ_j W_j) · (1 − π_i) · τ_i
         = pool share × survival/hunt risk × trait effects
```

On-chain Alpaca (precise):

1. Location weight w(L) ∈ {1, 2, 3, 5, 8} (Home…River).
2. Effective weight numerator: Farmer uses 1.20 × w(L), else w(L).
3. Gross: r_i^(A,gross) = R_d^A · ω_i / Ω_d (last participant absorbs dust).
4. Penalty rate π_i from location pressure + traits (King / Guardian / Lucky / Runner).
5. Net credited: r_i^(A,net) = r_i^(A,gross) × (1 − π_i).

On-chain Cougar (precise):

1. Base: equal split of R_d^C among valid Cougars.
2. Hunt: if location huntable and ≥1 Alpaca there, share of R_d^H proportional to Alpaca count at that location; else hunt share 0 and R_d^H → dust/unallocated.

2.3 Worked example (illustrative, not a forecast)

Assume R_d = 400,000, so R_d^A=320,000, R_d^C=40,000, R_d^H=40,000.

Example A — two Alpacas, no Cougars, both at Grassland (w=3), Common class, π=0:

```
Ω = 3 + 3 = 6
r_1 = r_2 = 320,000 × (3/6) = 160,000
```

R_d^C+R_d^H become unallocated (no Cougars) and stay in Treasury.

Example B — one Common Alpaca and one Cougar both at Grassland; Alpaca faces pressure:

- Alpaca receives gross from R_d^A, then net after π > 0.
- Cougar receives base R_d^C (alone ⇒ all of it) plus hunt share of R_d^H if hunt succeeds.
- Penalties from Alpaca return to Treasury (not paid to the Cougar wallet).

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3. Alpaca vs Cougar Economic Model

Dimension	Alpaca	Cougar
Supply (Genesis)	500	50
Pool access	R_d^A (80%)	R_d^C (10%) + R_d^H (10%)
Income drivers	Location weight, Farmer +20% weight, trait mitigation of π	Equal base split; hunt share if co-located with Alpacas
Primary risk	Hunting penalty π at non-Home locations	Failed hunts (R_d^H dust); competition among Cougars
Home	Allowed (safe from hunt π^0=0)	Illegal (invalid day)
Traits	King / Guardian / Farmer / Lucky / Runner / Common	None (uniform w^C=1)

Demand for gameplay: Alpacas create “prey density” that makes Hunting Pool meaningful; Cougars create risk that makes location and trait choice meaningful. Neither side’s rewards are automatic — both require valid Commit + Reveal.

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4. Game Theory Analysis

4.1 Expected value (decision frame)

For a rational player deciding whether to acquire / play an NFT:

```
EV = Σ_{s ∈ S} Pr(s) · Reward(s) − Cost
```

where S is the set of plausible day outcomes, and **Cost** may include NFT acquisition, opportunity cost, and gas — **not** protocol fees on rewards (claims are pull transfers of already-reserved amounts).

Players condition on:

- NFT acquisition cost and secondary-market liquidity
- Skill (location choice, when to risk River vs Home)
- Survival / hunt probabilities (endogenous to the day's cohort)
- Current G and thus R_d band

Important: EV can be negative. High skill does not imply profit after NFT cost.

4.2 Population balance (Nash-style intuition)

Let n_A, n_C be active Alpacas and Cougars on a day at overlapping locations.

- **Too many Cougars:** Base pool R_d^C splits thinner; hunt competition rises; Alpacas may hide at Home → fewer successful hunts → R_d^H dust ↑.
- **Too many Alpacas:** Alpaca gross shares dilute; Cougars enjoy denser hunt targets but Alpacas may spread across locations.
- **Balanced play:** Risk and reward remain interesting for both sides → higher engagement.

This is **not** a solved closed-form Nash equilibrium claimed by the protocol; it is a qualitative stability argument consistent with the asymmetric pool design (80/10/10).

4.3 Conservation identity (protocol invariant)

For each settled day:

```
R_d = playerTotal          (reserved for claims)
    + P_d^pen              (stays in Treasury)
    + unallocated          (dust + empty pools + failed hunt R_d^H)
```

So emission never "disappears"; unpaid pool mass remains spendable G (except amounts later claimed by players).

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5. Treasury Sustainability Model

5.1 Gross runway (informational)

Ignoring sinks, penalty recycling, and band step-downs:

```
Lifetime_gross ≈ G_0 / R_0
               = 300,000,000 / 400,000
               = 750 days
```

5.2 Why actual lifetime differs

Factor	Effect on runway
Emission step-downs	R_d falls as G falls → **longer** calendar life

Penalties / unallocated / hunt dust	Stay in Treasury → **slower** net drain than R_d per day
Player claims	Reduce balance when paid
Token sinks (players → Treasury)	Can **increase** G
Safe mode G < G_safe	R_d=0, Commit paused → freeze until rebuilt
Activity level	Low participation → more unallocated; high participation → more `playerTotal` reserved

5.3 Funding intent

Operational launch planning targets GameTreasury near G_0 = 300,000,000 so early days sit in the R_d = R_0 band, subject to actual funded amount and subsequent dynamics.

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6. Two-Sided Value Creation

Players gain	Ecosystem gains
↑ Contingent reward opportunities	↑ Daily active participation
↑ NFT utility (identity + traits)	↑ Retention via day loop
↑ Competitive / entertainment value	↑ Demand for Genesis NFTs
↑ Agency (location, side, traits)	↑ `$HANSOME` utility (claims, sinks)
↑ Transparent, auditable math	↑ Sustainable emission discipline

A healthy GameFi economy requires **both** sides: unbounded player extraction without runway destroys the game; a full Treasury with no players creates no culture. HANSOME couples them through G → R_d and asymmetric roles.

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7. Why HANSOME's Economy Is Designed for Long-Term Sustainability

This section explains **design intent**, not expected returns. Longevity depends on participation, funding of GameTreasury, ops quality, and markets. Nothing here guarantees profit for players or the project.

7.1 Comparison with traditional Play-to-Earn (P2E)

Theme	Typical historical P2E pattern	HANSOME approach (implemented)
Reward source	Often continuous mint / inflationary emissions	Rewards paid from **pre-funded GameTreasury**; `$HANSOME` supply is **fixed** (no gameplay mint)

Emission control	Hard to stop once flywheel of "print → sell" starts	R_d = f(G) **step bands** shrink the daily pool as G falls; safe mode can halt Commits
Player incentive	Maximize extractable tokens today	Compete for a **bounded** daily pool via Commit / Reveal / skill
Ecosystem incentive	Grow users even if emission is unsustainable	Preserve runway so the day loop can remain meaningful longer
Risk to holders	Dilution from new mint	Dilution from gameplay mint is **structurally removed**; market risk remains

Traditional P2E often failed when emissions outran sinks and newcomers funded exits. HANSOME does not claim to eliminate market risk; it **removes unlimited reward minting** as a protocol lever and ties payouts to treasury health.

7.2 Fixed-supply token advantage

`$HANSOME` is a **fixed-supply** ERC-20: the full supply was minted once at token deployment; there is no owner mint for gameplay rewards.

Implication	Why it matters for sustainability
Settlement never mints	Claiming cannot inflate supply
Game rewards = transfers	Every HANSOME paid to players left GameTreasury (or was already outside it)
Tokenomics unchanged by this model	Game math does **not** rewrite total supply, taxes, or LP allocation

Fixed supply does **not** imply price support. It only means the game cannot "print its way" out of a reward schedule.

7.3 Treasury-controlled reward emission

Daily emission is gated by spendable treasury balance G:

```
R_d = f(G),
f is a decreasing step function of G relative to G_0.
```

- High G → larger R_d (up to R_0 = 400,000).
- Falling G → automatic step-downs (280,000 → 160,000 → 80,000).
- G < G_safe → R_d = 0 and Commits paused in the implementation.

Penalties, split dust, empty-pool remainders, and failed-hunt R_d^H stay in the Treasury (conservation identity). Sinks can return tokens to G. Together, these mechanisms **slow net drain** relative to a naive "always pay full R_d with no recycling" model — without promising a fixed calendar lifetime.

7.4 Player vs ecosystem alignment

If the design over-favors…	Failure mode	HANSOME counterweight
Players only	Treasury empties; later cohorts get nothing meaningful	Emission bands + safe mode + no mint
Ecosystem / Treasury only	No reason to play; NFTs idle	Positive R_d while G ≥ G_safe; asymmetric pools; pull claims
Short-term extraction	Dump pressure after farm	Bounded R_d; rewards require valid play each day

Alignment means: **active play** is the path to contingent rewards, and **treasury health** is the path to continued emission. Neither side is promised a win; both are constrained by the same G.

7.5 Alpaca / Cougar two-sided gameplay economy

Sustainability is not only about G; it is also about **keeping both roles interesting**:

- **Alpacas (80% pool):** Location weight, traits, and hunting risk create strategic depth. Over-hunting pressure pushes Alpacas toward safer locations — which reduces Cougar hunt success.
- **Cougars (10% + 10% hunt):** Need Alpaca presence to monetize the Hunting Pool; too many Cougars dilute base shares and can starve hunt opportunities.
- **Feedback loop:** Imbalance reduces EV for the overcrowded side → players may switch roles or locations → engagement stays competitive rather than one-sided farming.

A one-sided "only farm the high APY role" meta is what burned many P2E titles. The 80/10/10 split plus hunt dependency is intended to make **mutual demand for opponents** part of the economy — again without guaranteeing that any role is profitable after NFT cost.

7.6 What "long-term" does and does not mean

This document claims	This document does **not** claim
Emission is bounded and treasury-linked	Guaranteed years of rewards
Fixed supply blocks reward inflation	Guaranteed token price
Two-sided play supports retention design	Guaranteed player profit
Gross runway at G_0/R_0 ≈ 750 days is an **illustration**	That illustration equals real calendar life

Sustainability here means **structural resistance to unlimited emission**, not a promise that the economy will always grow or that participants will earn net positive returns.

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8. Example Scenarios

Scenario A — High treasury health

Item	Value
G	≥ 210,000,000 (0.70 G_0)
R_d	400,000
Player impact	Maximum designed daily pool
Sustainability	Fastest gross drain; still ~hundreds of days at R_0 from G_0

Scenario B — Medium treasury

Item	Value
G	e.g. 120,000,000–210,000,000
R_d	280,000 (or 160,000 if lower)
Player impact	Smaller absolute rewards; competition still matters
Sustainability	Step-down automatically extends life

Scenario C — Low treasury / protection mode

Item	Value
G	15,000,000 ≤ G < 60,000,000 → R_d=80,000; G < 15,000,000 → R_d=0
Player impact	Minimal or **no** Commit (safe mode)
Sustainability	Protocol prioritizes Treasury recovery (e.g. sinks) over emission

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9. Claim Path (economic settlement)

```
Gameplay → finalizeDay (reserve playerTotal from G)
       → creditBatch (book claimable[tokenId])
       → claim / claimMany (Treasury pays $HANSOME to player)
```

RewardDistributor holds **no** token inventory; it only tracks claimable balances. Double-claim is prevented by zeroing claimable before transfer.

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10. Risks (non-exhaustive)

- NFT and token prices are volatile; rewards in HANSOME ≠ fiat profit.
- Missed Reveal → zero reward for that NFT that day.
- Safe mode can halt Commits.
- Population imbalance can compress one side's EV.
- Smart-contract / operational / market risks remain.

- This model does **not** cover off-chain speculation or leveraged products.

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11. References

Resource	Location
Live game	https://game.hansomealpacas.xyz/
Litepaper	https://game.hansomealpacas.xyz/litepaper
GDS v1.1 (EN)	`docs/HANSOME_GDS_v1.1_en.md`
Emission / settlement code	`contracts/contracts/game/EmissionController.sol`, `SettlementLib.sol`
Chinese edition	`docs/HANSOME_GAME_ECONOMIC_MODEL_ZH.md`
PDF (EN / ZH)	`docs/HANSOME_GAME_ECONOMIC_MODEL_EN.pdf`, `…_ZH.pdf` · also served under `/docs/` on the site

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