

HAPPY: Staking Model

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1 Components

1.1 Emission Schedule

Proportion of emitted supply (ES) to maximum supply (MS) at any given point is defined as

$$\frac{\delta t}{HS + \delta t}$$

where δt is the total duration during which the contract held a non-zero amount of stake, and HS (half supply) is an arbitrary duration during which the initial half of the maximum supply is emitted. In HAPPY, HS is set to 200 days.

1.2 Reward Per Token Stored

(describe reward per token stored here). On each interaction (i.e.: stake, withdraw, claim), contract records the amount of reward tokens eligible to be claimed by each staked token. The first step in deriving reward per token requires calculating ES/MS between now and last update time (i.e.: time of last interaction).

1.2.1 ES/MS Between Now and Last Update Time

ES/MS between now and last update time is calculated by subtracting ES/MS until previous update from ES/MS until now.

$$\frac{\delta t}{HS + \delta t} - \frac{\delta t_2}{HS + \delta t_2}$$

In the contract, δt is defined as $blockTime - _stakelessDuration$, where $blockTime$ is the block submission time in Unix time, and $_stakelessDuration$ is the duration since Unix epoch during which the contract held zero stake. Similarly, δt_2 is defined as $lastUpdateTime - _stakelessDuration$, where $lastUpdateTime$ is the Unix time on last contract interaction. Substituting variables used in the contract gives the following expression.

$$\frac{blockTime - _stakelessDuration}{HS + blockTime - _stakelessDuration} - \frac{lastUpdateTime - _stakelessDuration}{HS + lastUpdateTime - _stakelessDuration}$$

This expression is then simplified by getting the common denominator and simplifying the numerator. Which in turn results in the following expression.

$$\frac{HS \times (blockTime - lastUpdateTime)}{(HS + blockTime - _stakelessDuration) \times (HS + lastUpdateTime - _stakelessDuration)}$$