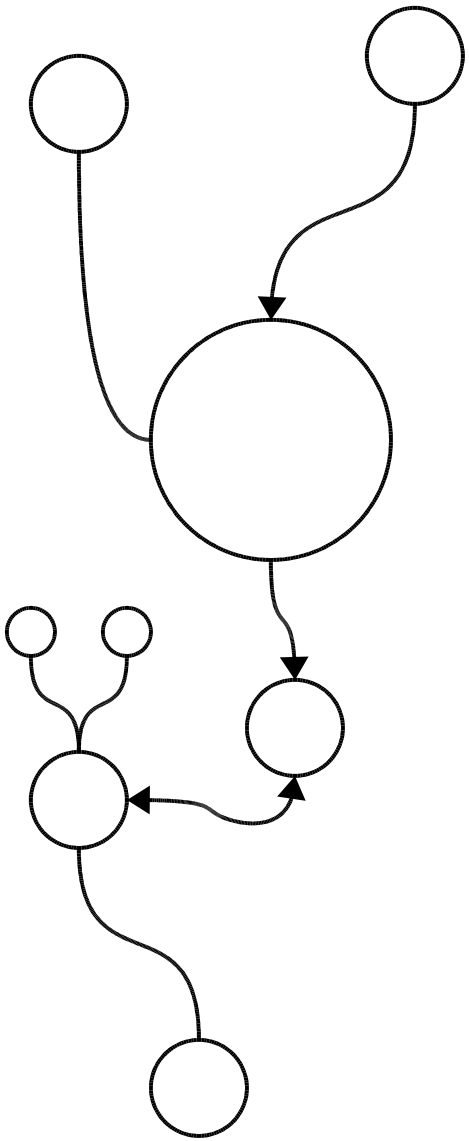
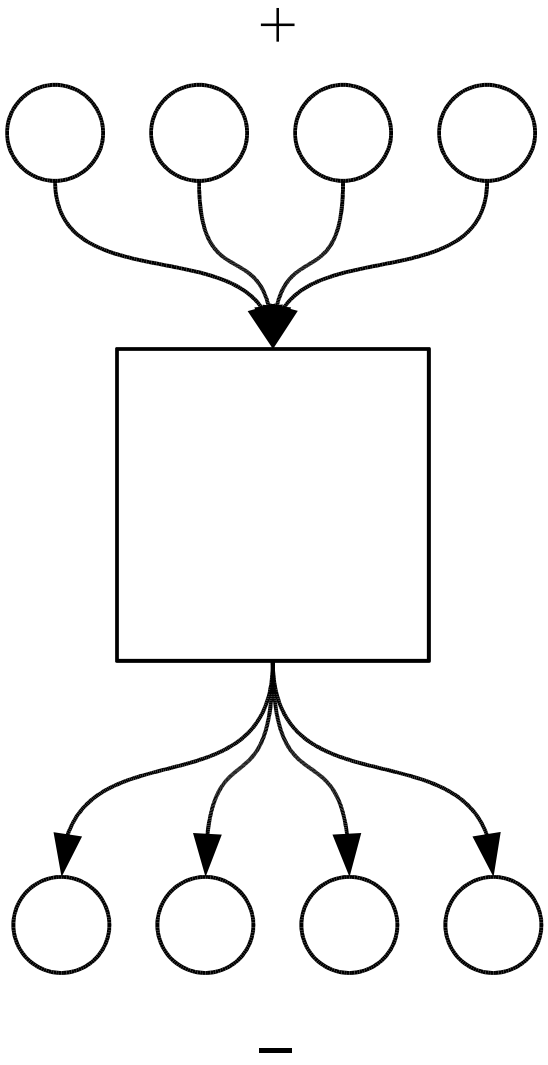
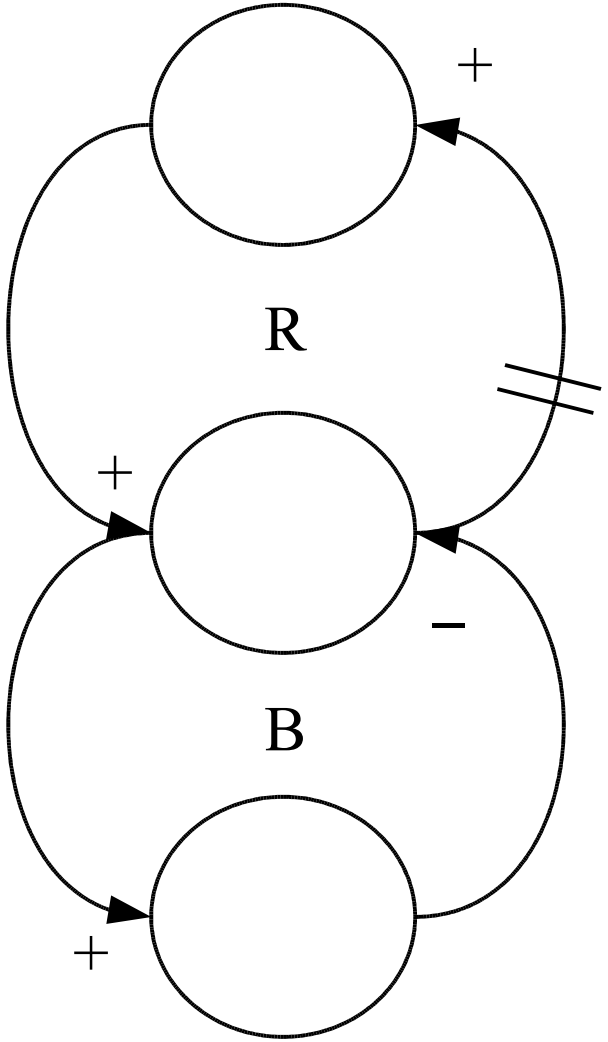


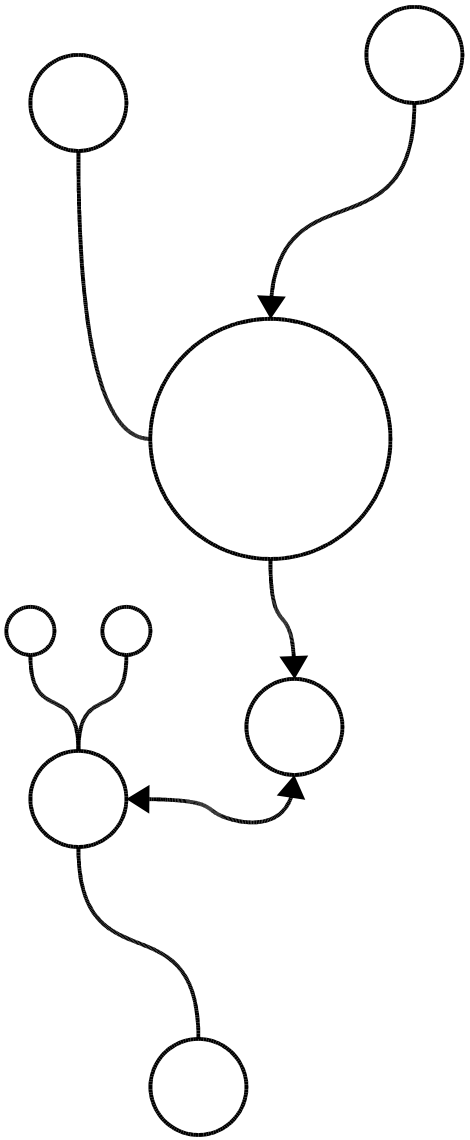
Concept Map



Stock & Flow



Causal Loop

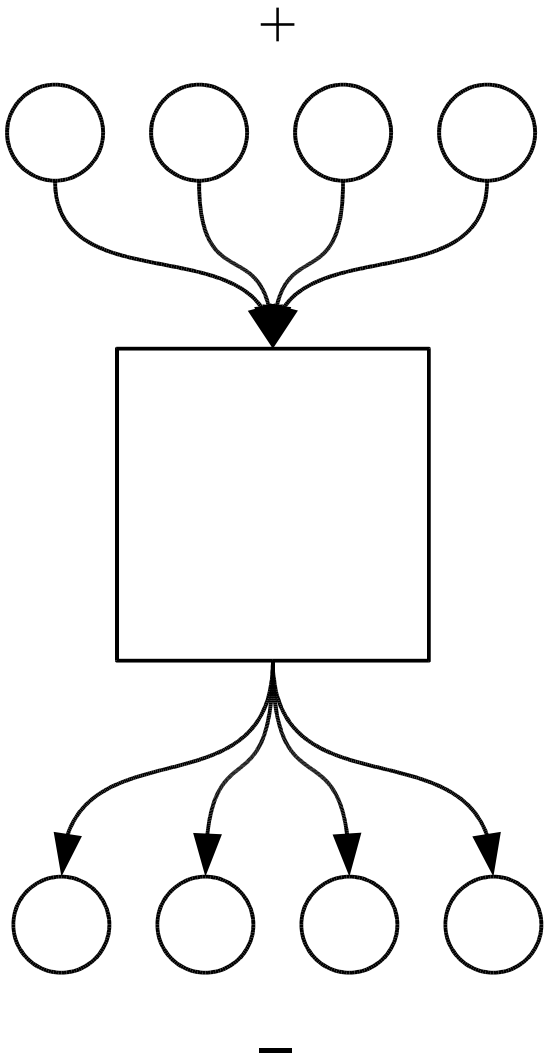


Using Concept Maps

Display relationships between concepts

Use arrows to indicate influence

For clarity, write sentences along connecting lines, like "X is a contributing factor to Y"

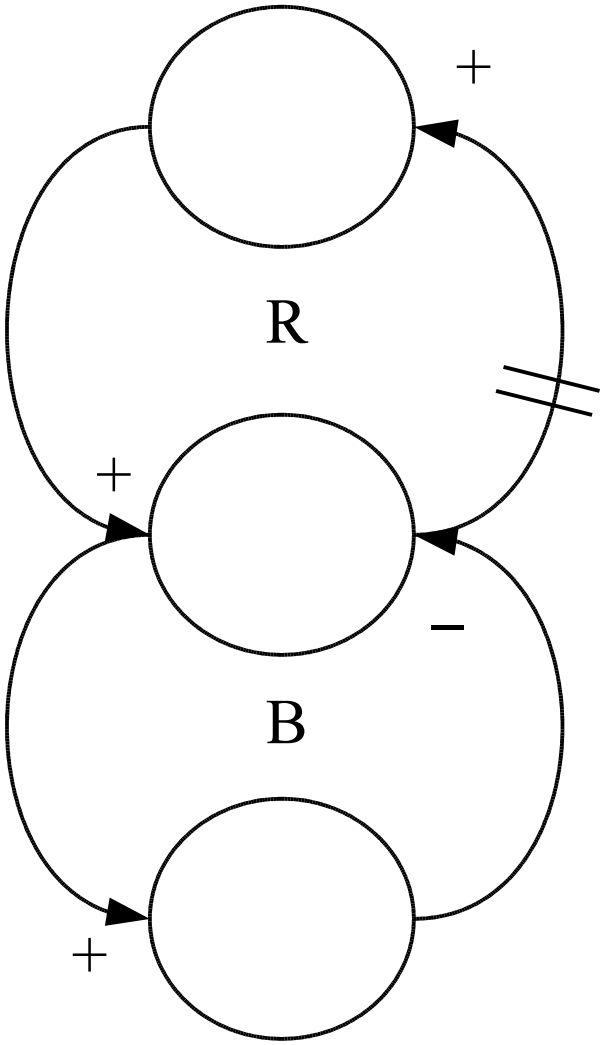


Using Stock & Flow

The stock to be tracked is placed in the center

Conditions which increase the stock are grouped together.

Conditions which decrease the stock are grouped together.



Using Causal Loops

Directional arrows indicate direction of cause and effect

An arrow with a + symbol indicates that the cause and effect move in the same direction

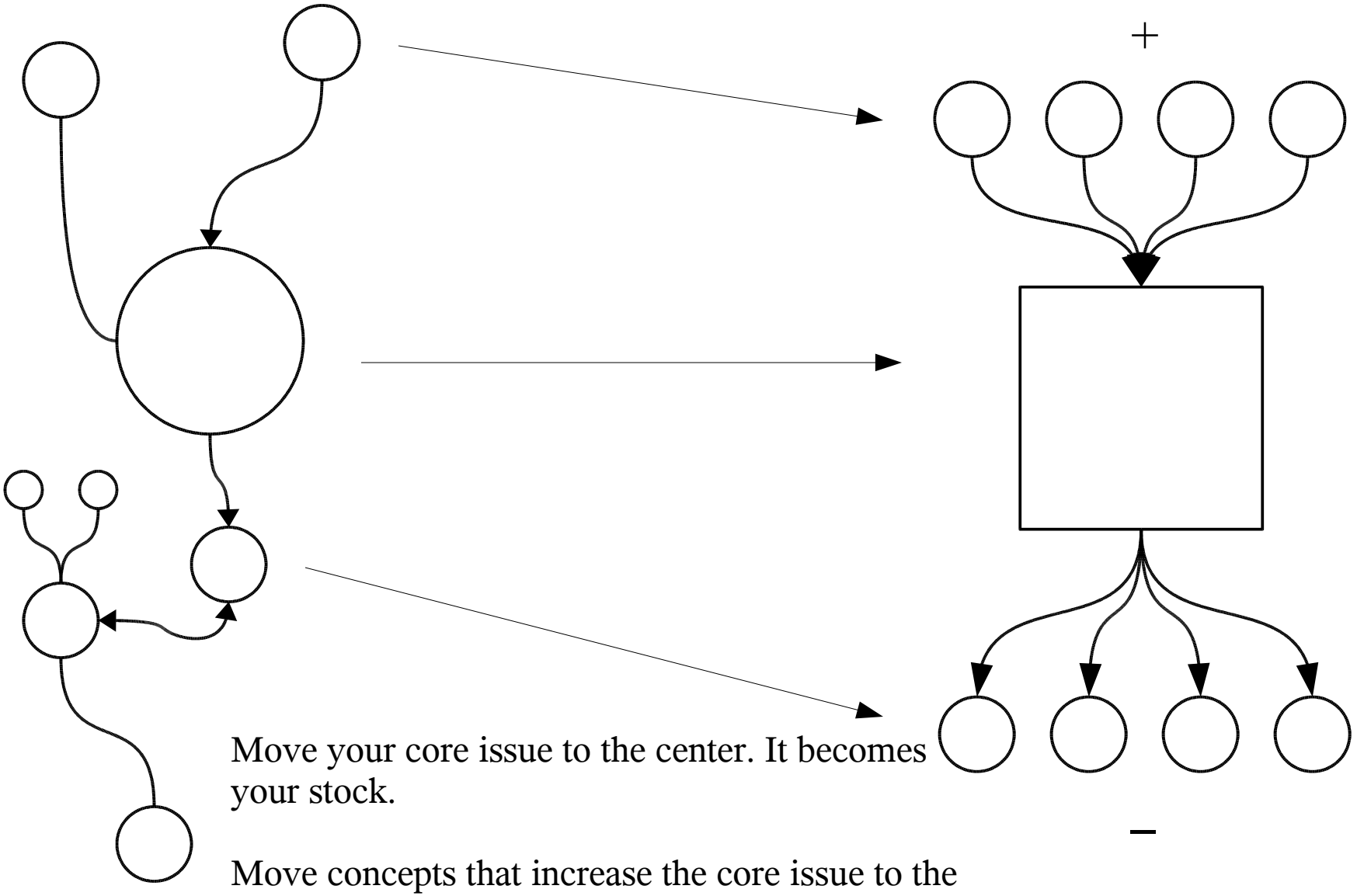
An arrow with a – symbol indicates that the cause and effect move in opposite directions

A loop with an even number of + symbols is a reinforcing loop. The effects will accelerate.

A loop with an odd number of + symbols is a balancing loop. The effects will balance.

Double crosshatches on a line indicate a significant delay.

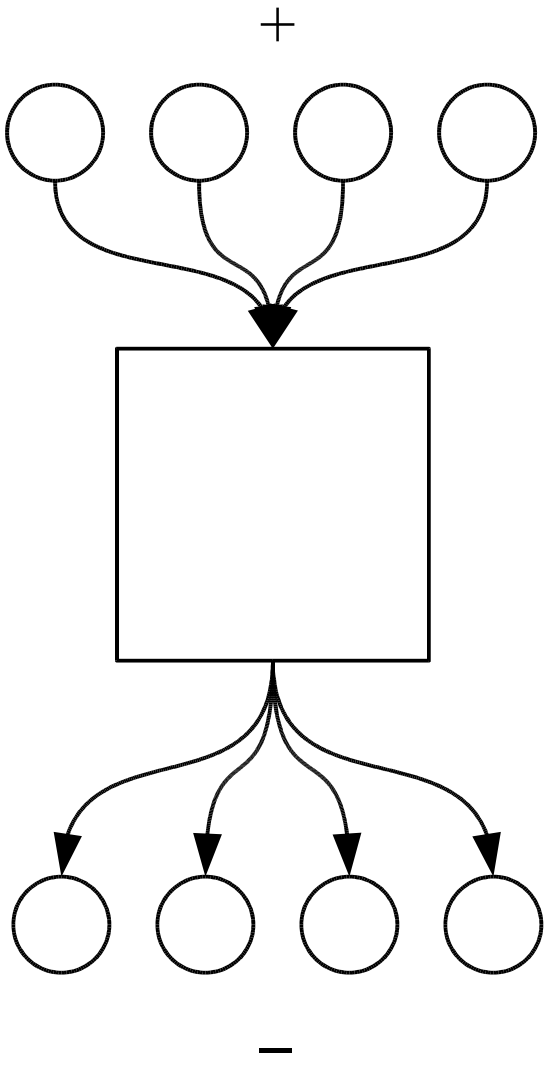
From Concept Maps to Stock & Flow



Move your core issue to the center. It becomes your stock.

Move concepts that increase the core issue to the + side, and concepts that decrease the core issue to the - side.

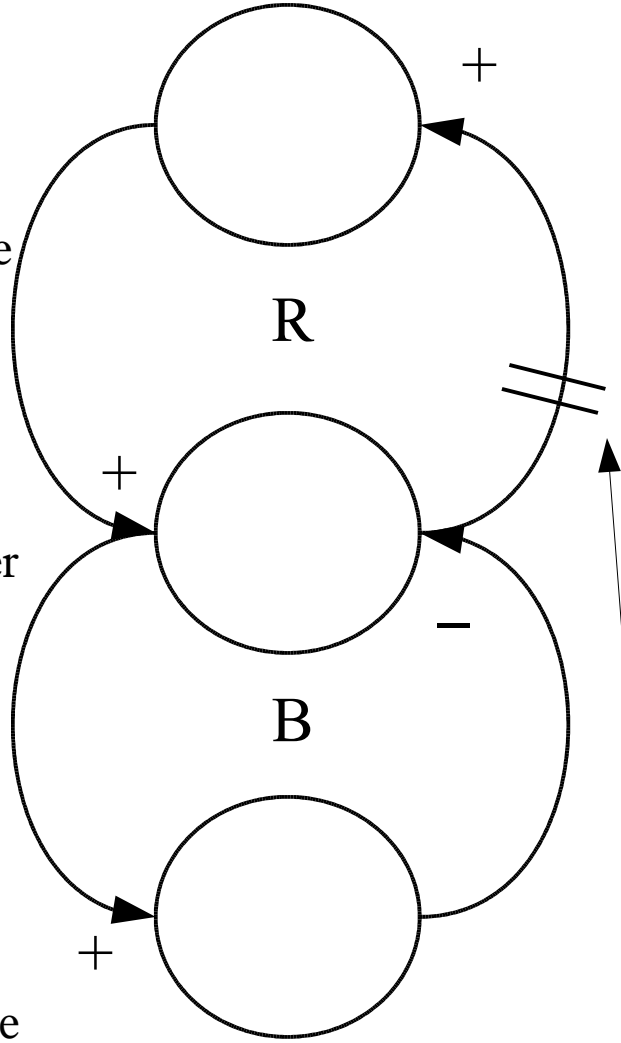
From Concept Maps to Stock & Flow



Surface reciprocal relationships that increase the core issue. These are your reinforcing loops.

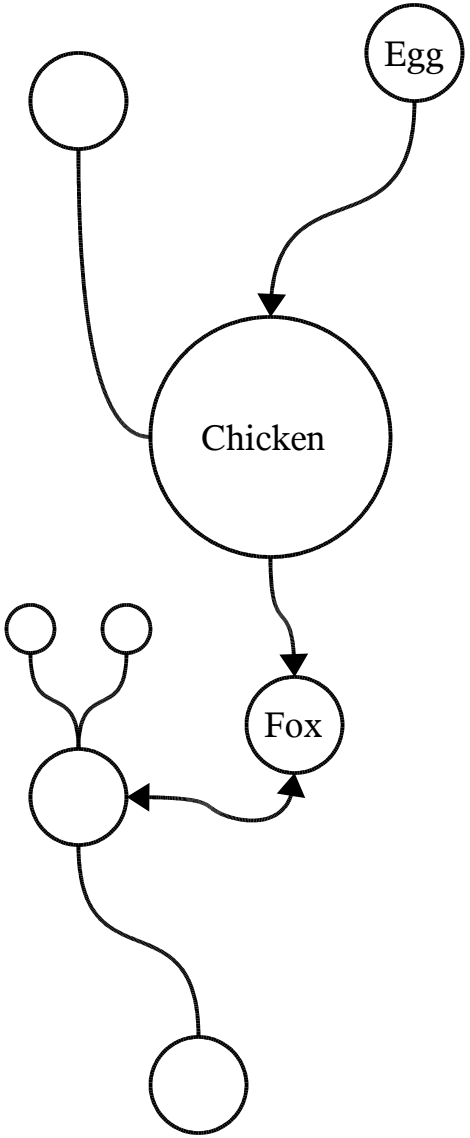
Move your stock to the center of the causal loop.

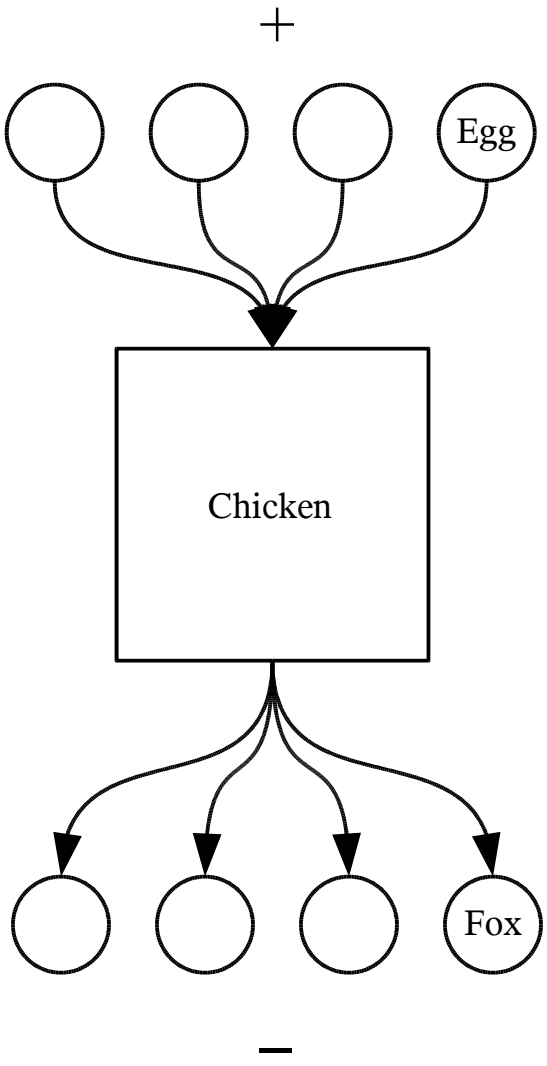
Surface reciprocal relationships that decrease the core issue. These are your balancing loops.

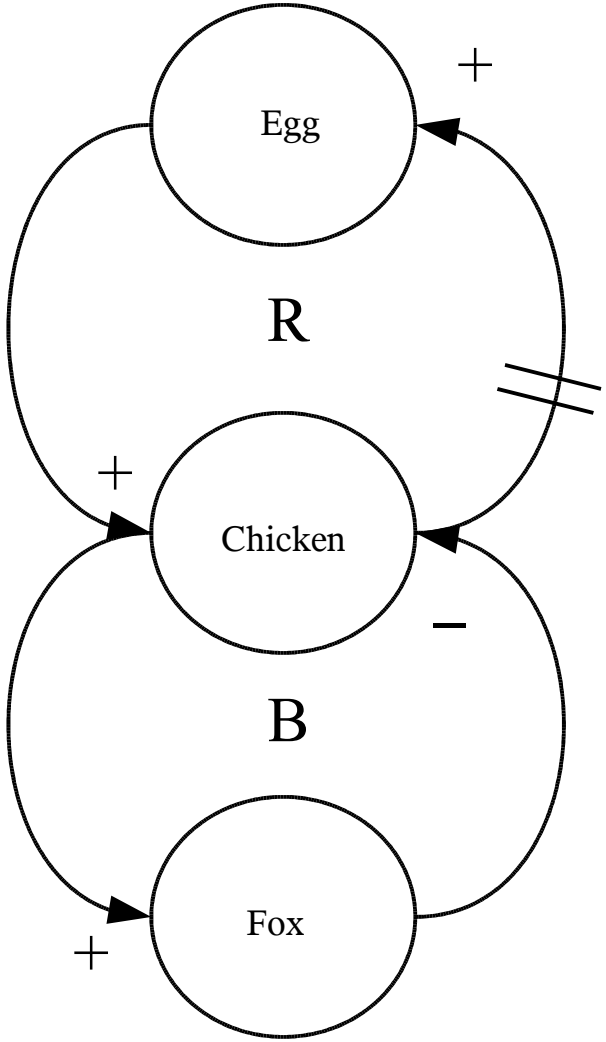


Make special note of significant delays in the causal loops.

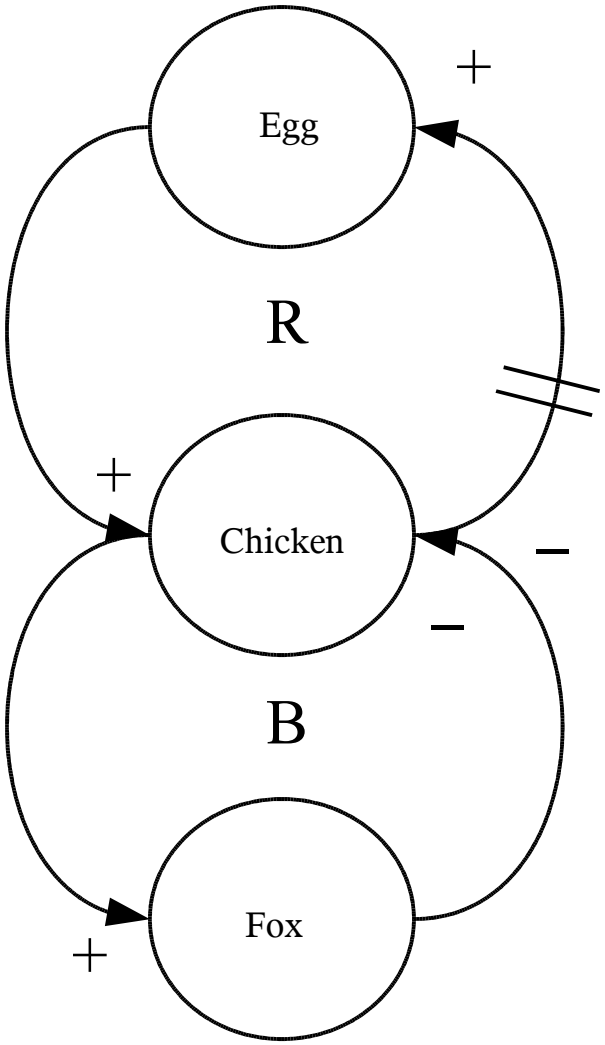
Chicken Farming







1st Order Change

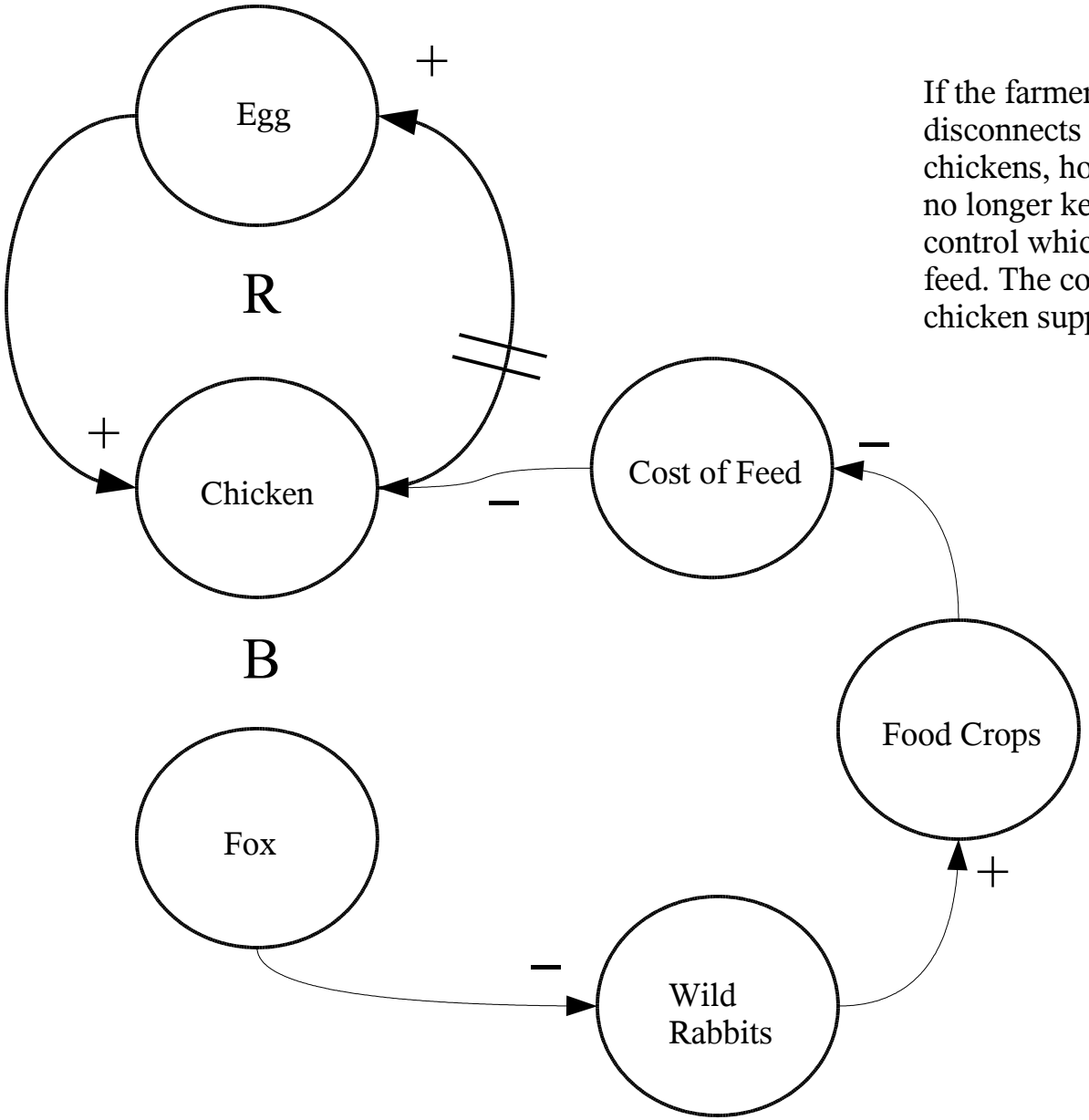


If the farmer merely increases the supply of chickens, then the fox population increases which eventually balances the change.

If the farmer merely increases the supply of eggs, then the chickens increase but so, again, does the population of foxes.

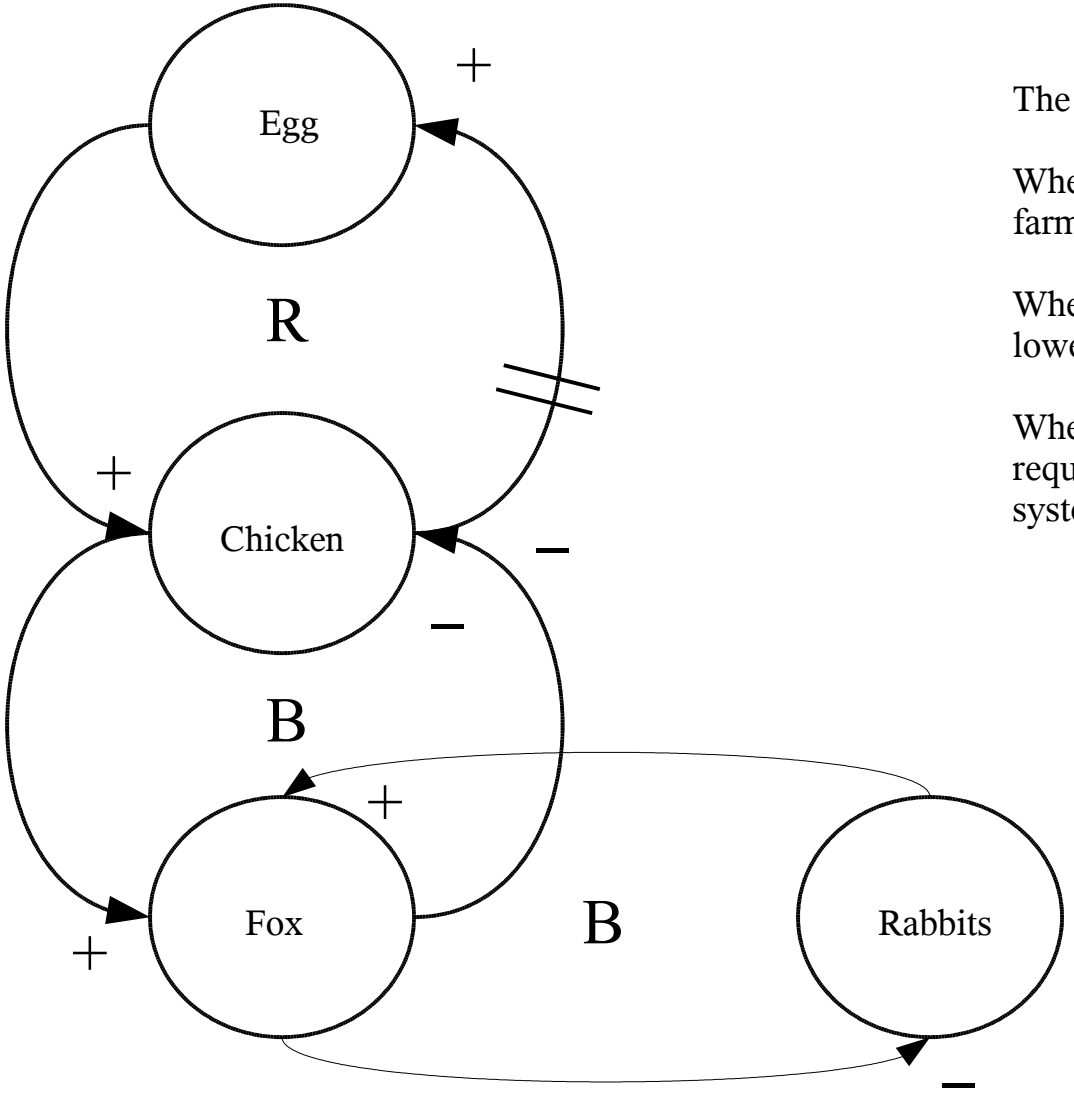
Ultimately, the causal loop is not altered by these changes

Ineffective 2nd Order Change



If the farmer builds a better fence, this disconnects the Fox from the supply of chickens, however when the foxes die out they no longer keep the wild rabbit population under control which eventually increases the cost of feed. The cost of feed negatively impacts the chicken supply.

Creative 2nd Order Change



The farmer builds a rabbit farm.

When the price of chickens increases, the farmer lowers the fences that protect the rabbits.

When the price of rabbits increases, the farmer lowers the fences that protect the chickens.

Whether this is effective in the long run will require a long-term relationship between the system and the change agent