It all starts with

GOOD MILK

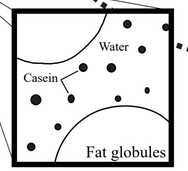
Invest in the land to get good crops,
Harvest good crops to make nutritious feed,
Make nutritious feed to have a healthy herd.

Keep Cows healthy,
Keep Cows safe,
Keep Cows comfortable,
Keep Cows relaxed.

LACTOSE (Sugars)
CASEIN, WHEY (Protein)
FATS & ASH (Minerals)z

"Pasteurize"

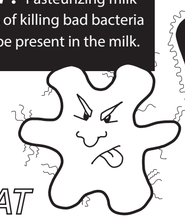
1.



WHAT? Pasteurizing milk is a process of killing bad bacteria that may be present in the milk.

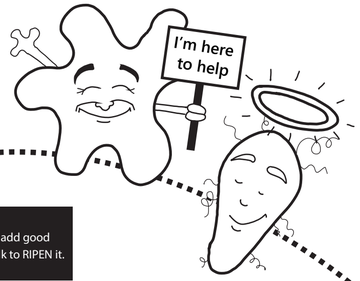
How?

HEAT



"acidify"

2.



WHAT? We add good bacteria in to the milk to RIPEN it.

This is where it gets sciency and complicated.
Some of the lactose is converted to Lactic Acid.
There are ***Mesophilic*** and ***Thermophilic*** Bacterial Starter Cultures.

Not too hot, please

less than 108 degrees

up to 125 degrees

More heat! More heat!

APPEL FARMS

CHEESE SCIENCE

Cow comfort is not only a moral responsibility, it is the only logical path to success. We take care of the cows, and they take care of us.

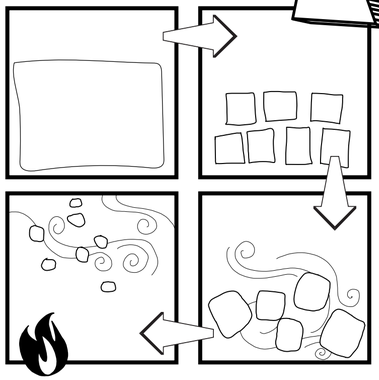
Cheesemakers can start to manipulate texture and moisture content by adjusting the time and temperature of the curd's cooking stage.

EXAMPLES:

1. ***Quark*** is a soft, spreadable cheese. It's curd is not cut or cooked, it is separated from whey in a cheesecloth.
2. ***Feta*** curd is cut, stirred, but not cooked, and placed in forms to naturally settle and release whey.
3. ***Havarti*** curd is cut, stirred, and cooked and placed in forms. It is flipped repeatedly, but not pressed.
4. ***Parmesan*** curd is cut, stirred, cooked to a high temperature and pressed in forms.

"artistry!"

4.



The milk is coagulating, and looks like white jell-o. When the curd splits cleanly with a knife, it is set enough to cut.

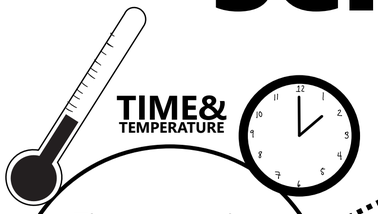
Curd is cut into cubes. It is extremely soft, and full of moisture. The separation of curds and whey begins. At this stage you must be very gentle with the curds.

The longer it is cooked and stirred, the smaller and drier the curd. The drier the curd, the less moisture in the final cheese.

As the curds are stirred, they bump against eachother and release more and more whey.

Cooking the Curds

HERBS& SPICES



TIME& TEMPERATURE

There are other factors that can be manipulated to achieve unique qualities in the final product.

PRESSURE

SALT

MOLDS& RIND WASHES

Examples: Chevre, Cottage Cheese

SOMETIMES NO STEP 2

"Think about how magnets repel if you try to push together two of the same poles. Adding acid, in effect, is like adding positive charge. The addition of acid neutralizes the micelle surface and this allows them to bump into each other and stick."

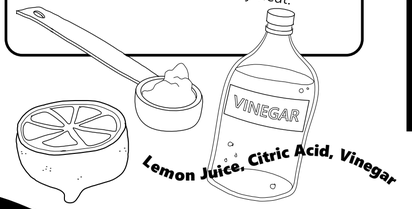
ACID

Examples: Paneer, Ricotta, Mascarpone

No Step 2

ACID+HEAT

"Whey proteins are denatured (unraveled) by heat exposing "sticky" portions of their structure. These sticky ends can bond to each other across whey proteins or bond to casein proteins. Acid can now also contribute to whey coagulation now that they have been denatured by heat."



Lemon Juice, Citric Acid, Vinegar

Quotes from CheeseScience.org

"coagulation"

3.

Examples: Gouda, Havarti, Cheddar, Parmesan, Swiss Mozzarella, Etc.

RENNET

"Casein micelles are covered with a negatively-charged "hairy" layer of κ-casein. Rennet enzymes act like a razor and shave off the κ-casein hairs. Without the hairs, the micelles can now stick, aggregate, and form the backbone of cheese structure."

WAIT!

What is Rennet?

GOOD QUESTION

Rennet refers to enzymes used to coagulate milk.
There are FOUR sources utilized in cheesemaking today:

Animal Rennet: Made of Chymosin & Pepsin from the lining of a Calf's stomach.

Touted as having the best flavor by most cheesemakers.

Fermentation Produced Chymosin: A strain of Chymosin from the Calf is multiplied by a laboratory.

Created when there was a shortage of calf's rennet.

Vegetable Rennet: A coagulant made from a thistle plant.

Created from a plant source, but known to have bitterness

Microbial Rennet: A coagulant made from specific kinds of fungi.

Vegetarian option without the bitterness from the thistle plant