

## CHATGBT Question:

1. How fast does raw milk and its bioactives, inactivate flu virus in raw milk?
2. What are the mechanisms?

The speed at which antiviral antibodies and bioactive components in raw milk inactivate the flu virus (or similar viruses) depends on several factors, including the concentration of these components, the specific viral strain, and the conditions of interaction (e.g., temperature, pH, and exposure time). While there isn't direct, detailed research specifically quantifying how fast raw milk components inactivate the flu virus, insights from related studies suggest the following:

# Key Bioactive Components and Their Likely Timing

1. **Lactoferrin**
  - **Mechanism:** Binds to viral particles or host cell receptors, blocking entry into cells.
  - **Timing:** Lactoferrin has been shown to inhibit viral replication *within minutes to hours* under laboratory conditions, depending on the virus.
2. **Immunoglobulins (Antibodies)**
  - **Mechanism:** Neutralize viruses by binding to them and preventing cell attachment or entry.
  - **Timing:** Neutralization can occur *rapidly*, often within minutes of exposure, especially if the antibodies are specific to the flu virus.
3. **Fatty Acids (e.g., Lauric Acid)**
  - **Mechanism:** Disrupts viral envelopes, compromising the virus's ability to infect cells.
  - **Timing:** Studies suggest membrane disruption can occur in *minutes to a few hours*, depending on the concentration of fatty acids.
4. **Lysozyme**
  - **Mechanism:** Primarily acts against bacteria but may indirectly weaken co-infections or degrade viral protection mechanisms.
  - **Timing:** Effects are gradual, often requiring *hours* to manifest fully.
5. **Probiotics and pH Changes**
  - **Mechanism:** Beneficial bacteria in raw milk can lower pH and create an environment hostile to viruses.
  - **Timing:** Acidification and microbial effects typically take *hours to days* to significantly impact viruses.

# Factors Affecting Speed of Inactivation

## 1. Concentration of Active Compounds

Higher levels of lactoferrin, antibodies, and fatty acids in raw milk accelerate viral inactivation.

## 2. Viral Load and Strain

Enveloped viruses like influenza are more susceptible to these bioactives than non-enveloped viruses.

## 3. Environmental Conditions

- Optimal temperature (body-like conditions, ~37°C) enhances enzyme and antibody activity.
- Alkaline or acidic conditions may also speed up some inactivation processes.

# Estimated Range

Based on related research:

- *Immediate to several hours*: Lactoferrin, antibodies, and fatty acids may begin inactivating flu viruses shortly after exposure, with significant effects within hours.
- *Longer-term effects*: Probiotics and microbial competition in raw milk could impact viruses over days.

# Important Note

While laboratory studies of individual bioactives are promising, the inactivation of flu viruses in raw milk specifically hasn't been extensively studied. Real-world effectiveness also depends on the raw milk's safety, as its consumption carries a risk of bacterial contamination.

**Take away:**

1. **Kefir would have ZERO active virus...no possible way.**
2. **Cultured Raw butter would have inactivated virus.**
3. **Raw milk would probably have no active virus, but our immediate chilling of milk might extend the time to inactive virus.**

