

In December of 2020, the Food and Drug Administration (FDA) granted Emergency Use Authorization (EUA) to two companies for their vaccinations against the virus COVID-19; Pfizer-BioNTech and Moderna. As this wild year comes to an end, I wanted to take this month's newsletter to put out some information about these newly available vaccinations against COVID-19. Although the topic does not directly relate to cows, I have been getting a lot of questions about the vaccine and have done a lot of reading and research myself. As a doctor and someone who recommends and answers questions regarding vaccination protocols regularly, I figured I might be able to compile a lot of information in one place for you all. The first page is a summary of the information in case you just want the bullet points. If you want some further reading... continue onto the second page! I hope this helps answer your questions regarding the COVID-19 vaccine.

How Does the Vaccine Work?

- mRNA vaccine: an injection of a "messenger molecule" that codes for a part of the COVID-19 virus → trains our immune systems to attack the virus
- 2 doses 3 weeks apart

Can the vaccine give you COVID-19?

No

How effective are the vaccines against COVID-19?

- Highly effective
- Pfizer-BioNTech 95% after 2 doses
- Moderna 94.1% after 2 doses

How safe are the vaccines?

- Overall, side effects were common with people receiving the vaccine, but the vast majority of these symptoms were mild to moderate.
- The most common side effects were pain, swelling, or redness at the site of the shot, chills, tiredness, and headaches.
- Serious side effects were very rare and included nausea/vomiting, fever, joint swelling, lymph node swelling, and allergic reaction.
- Both the vaccine technology and the ingredients in the vaccine have been studied for many years
- No deaths have been associated with receiving either vaccine

What are the vaccine ingredients?

- mRNA against COVID-19 spike protein, NOT produced using any type of fetal tissue or cell lines
- Lipid (oil) molecules used to help package the mRNA to deliver it to our bodies
- Saline solution: a few different salts/sugars dissolved in water to help deliver the vaccine
- No preservatives

Is there a difference between the 2 vaccines currently available?

- Similar efficacy
- Similar side effects
- Both require 2 doses
- Pfizer-BioNTech needs to be stored at much colder temperatures

How were the vaccines studied?

- Randomized, blinded, and placebo controlled studies
- The Pfizer-BioNTech study contained over 43,000 participants, and the Moderna study contained around 30,000 participants
- Studies on-going

When will the vaccine be available?

- Currently, we are in Phase 1 of vaccination distribution: healthcare workers and long-term care facility workers/patients
- Farmers are considered Phase 4
- Individuals over 65 or individuals with high-risk health conditions Phase 3

How Does the Vaccine Work?:

The Pfizer and Moderna vaccines are the same type of vaccine and work in the same way. Traditionally, a vaccine was created by injecting a piece of a disease that was changed in a way that would not give the recipient the disease, but still stimulate their immune system to mount a response to the disease. This would allow that person's immune system to fight the disease if it ever came in contact with it in the future. You can think of a vaccine like a training dummy for a troop of soldiers. The dummy looks exactly like the enemy, but isn't actually dangerous so the soldiers (your immune cells in this example) will "learn" how to beat the enemy when it comes time. This is the basis of vaccination.

The vaccines for COVID-19 are called "mRNA vaccines", and work in a similar way to this, but utilize a modern vaccine technology that has many benefits. Messenger RNA, or mRNA, is the go-between for DNA, or your genetic makeup, and proteins, aka "the stuff" that makes up our bodies. It is the messenger that brings all of our genetic information to life. To develop this type of vaccine, researchers looked at the genes of the COVID-19 virus and discovered the gene for a specific protein that allows the virus to attach to our cells and invade. They then took the mRNA for this protein and put it in a special type of particle that helps deliver it to our body. When this mRNA reaches our body, it allows our cells to actually make its own form of that protein. Our immune cells then see this protein and "learn" how to destroy it. When COVID-19 then later enters our bodies, our immune cells see that protein on the virus and can immediately destroy it. The COVID-19 mRNA vaccine is like an excellent general who helps his troops learn exactly how the enemy works by teaching them the top-secret weapon the enemy uses.

Benefits of mRNA vaccines:

The first successful use of a mRNA vaccine was published in 1990. Since then, researchers have been working hard on perfecting the technology because of several key benefits:

1. **Safety:** Since mRNA is completely non-infectious and not actually a part of the disease itself, there is no risk of infection from this type of vaccine. mRNA is destroyed quickly in the body after it does its job, so there aren't risks of it hanging around and causing issues.
2. **Efficacy:** mRNA is a more stable delivery method than other types of vaccines. Because it is more of a messenger, our bodies allow it enter making it a very effective type of vaccine.
3. **Production:** mRNA vaccines can be produced much quicker than other types of vaccines allowing it to be an excellent vaccine type for new emerging viruses such as COVID-19

mRNA vaccines have been in development for many different types of disease including emerging viruses such as Zika, flu, and coronavirus; other viruses such as HIV and rabies; and even cancer.

Can the vaccine give you COVID-19?:

No. There is absolutely no risk of contracting COVID-19 from these vaccines. These vaccines use mRNA and not a live virus.

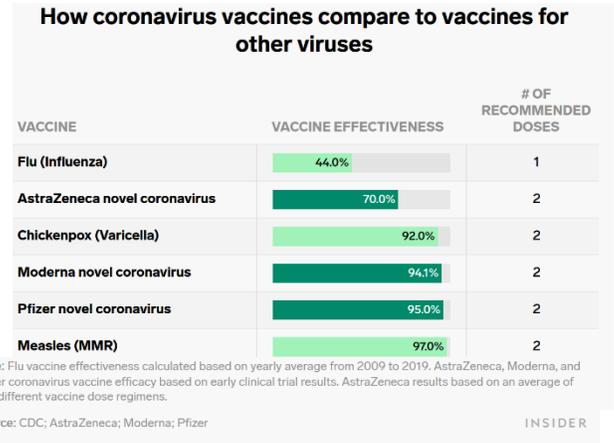
How were these vaccines studied?

The majority of the information we have on the vaccines comes from each company's large study. These studies were both classified as "randomized, blinded, and placebo controlled". These terms mean that the researchers did all they could to control bias, or in other words take out variables that could sway results one way or the other. "Placebo controlled" means that half the study subjects were injected with the vaccines, and the other half were injected with plain old salt water. "Blinded" means that the people getting the injections and/or the people giving the injections did not know if the vaccine or salt water was being injected. "Randomized" means that whether the study subject received the vaccine or the salt water was decided at random. **The Pfizer-BioNTech study contained over 43,000 participants, and the Moderna study contained around 30,000 participants.** Both studies are on-going, meaning that all participants will continue to be monitored 2 years past receiving the vaccine.

How effective are the vaccines against COVID-19?

While no vaccine is 100% effective, **both these vaccines are shown to be HIGHLY effective.** The chart to the right compares the efficacy of these vaccines to the efficacy of vaccines we currently use to protect against common diseases.

Based on the above studies: the Pfizer-BioNTech vaccine is shown to be around 95% effective after **TWO DOSES** given 3 weeks apart, and the Moderna vaccine is shown to be around 94.1% effective after **TWO DOSES** 1 month apart. The efficacy of the Moderna vaccine was shown to be slightly lower (85%) for study participants over 65 years of age, while the efficacy of the Pfizer-BioNTech vaccine was shown to be about the same across age groups. The duration of protection has not yet been determined for either of these vaccines.



How safe are the vaccines against COVID-19?

Like with any vaccine, there are side-effects to these vaccines because they are made to stimulate your immune system. I often tell clients that side effects of a vaccine given to their animal indicate that the immune system is working, meaning that the vaccine is working. **Overall, the side effect symptoms were common with people receiving the vaccine, but the vast majority of these symptoms were mild to moderate. The most common side effects were pain, swelling, or redness at the site of the shot, chills, tiredness, and headaches.** They most commonly occurred 1-2 days after receiving the vaccine, and more commonly occurred after the second dose. More severe and less common side effects included: nausea/vomiting, fever, joint swelling, lymph node swelling, and allergic reaction. Both the vaccine technology and all ingredients used with both these vaccines have been studied for many years. No deaths have been associated with receiving either of these vaccines.

Is there a difference between the two vaccines currently available?:

Both the Pfizer-BioNTech and Moderna vaccines are the same type of vaccine and work in the same way. Both vaccines require you to get TWO DOSES and have been shown to have around the same efficacy and side effects. The main difference between the two vaccines is the storage requirements. While both need to be kept cold, the Pfizer-BioNTech vaccine needs to be stored in an ultra-low temperature freezer between -80 and -60 degrees C, which may make this one harder to store in certain locations. Additionally, the Pfizer-BioNTech vaccine study was done in people 16 years and older, while the Moderna study was done in people 18 years and older.

What are the ingredients of the vaccine?

Both the vaccines contain mostly similar ingredients. First, there is the mRNA coding for the spike protein found on the COVID-19 virus. Both available vaccines were NOT produced with fetal tissue or fetal cell lines. Next, there are the lipid (oil) molecules that help protect the mRNA so it can be delivered to the body. Finally, there are several salts/sugars dissolved in water to help keep the mRNA stable to be delivered to the body. Neither vaccine contains preservatives.

Who should get the vaccine and when?:

At this time these vaccines have been studied in and given emergency approval for use in people over 16 years old (Pfizer-BioNTech) or over 18 years old (Moderna). They have not been studied in pregnant or lactating people.

These vaccines have been shown to be HIGHLY EFFECTIVE and SAFE, and if you are over the age of 16, you should consider getting the vaccine to help protect yourself and your community. If you are pregnant or lactating, you should talk to your health care provider if you wish you get this vaccine. People who have had severe allergic reactions to any of the ingredients in the vaccines should not be vaccinated.

As of right now, we are in Phase 1 of vaccine distribution. **Farmers are essential workers and will be considered in Phase 3 or 4, depending on your age.** It is unclear when exactly these phases will be occurring, but likely within the first half of 2021.

Population Risk & Essential Worker Phases

Phase 1	<ul style="list-style-type: none">Healthcare workers (clinical and non-clinical) in patient care settings<ul style="list-style-type: none">ICU, ED, EMS top priorityLong-term care facility (LTCF) workers who regularly interact with residentsMost at-risk long-term care facility patients
Phase 2	<ul style="list-style-type: none">First responders (fire, police, national guard)Teachers/school staff (in-person instruction), childcare providersPublic Health workersOther essential frontline workers that regularly interact with public (pharmacists, grocery store workers, transit employees, etc.) or maintain critical infrastructureOther long-term care facility patients and those living in other congregate settingsIndividuals in general population deemed particularly high risk due to comorbidities and health conditions
Phase 3	<ul style="list-style-type: none">Individuals over 65Individuals under 65 with high-risk comorbidities and health conditions
Phase 4	<ul style="list-style-type: none">All other essential workers
Phase 5	<ul style="list-style-type: none">Healthy adults and children

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