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Are you not quite ready for a COVID-19 vaccine?

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We've spent the last year of our lives listening to government officials give us guidance on how to stay safe, unable to celebrate holidays with family, juggling between remote and hybrid learning for our children and working under entirely different guidelines than ever before. And now finally, we have a vaccine that provides some light at the end of this dark tunnel—yet for many people, the question of whether or not to receive a COVID-19 vaccine is a very difficult one. Answering that question requires weighing the pros and the cons. For a dairy producer, it is important to understand how acquiring COVID-19 could impact your operation whether it be you or your workers who contract the virus. Can your business survive if you or your employees are out of work for a lengthy period of time? This article is written with the intent to answer some of these questions which may help you to make your decision.

There are now three commercially available vaccines in the United States - Pfizer, Moderna and Johnson & Johnson. All 3 have undergone extensive testing, first in animals and then in humans to examine both efficacy and safety. The Pfizer and Moderna vaccines were both developed using more novel technology employing the use of mRNA. When the mRNA is injected into your body, it signals your body to produce the spike protein which is what decorates the outside of the viral particle (see

photo). Once your body recognizes the spike protein, antibody production begins. These antibodies serve to protect you if you do come in contact with COVID-19. Both of these vaccines exhibited >94% efficacy in the clinical trials with >74,000 study participants. The Johnson & Johnson vaccine utilizes a viral vector to stimulate an immune response. This is a more traditional approach to vaccine development as it takes a piece of the virus (spike protein) that is unable to replicate or cause disease and when injected, the body is signaled to produce antibodies against that target. This vaccine demonstrated 66% efficacy

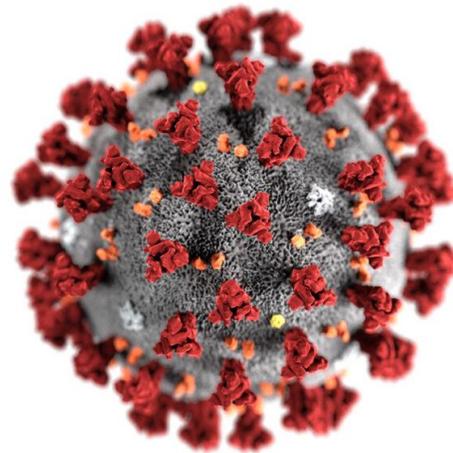


Figure 1. Spike proteins on a COVID-19 virus particle.

in the 90,000 study participants involved. All three of these vaccines are unable to give you COVID-19 and also lack preservatives which have been a long-time concern for many who question the safety of vaccines. Although the vaccine rollout seems alarmingly fast, you have to remember the technology for even the mRNA vaccines, which albeit are much more novel,

had already been developed for other pathogens. Therefore, the groundwork was there for developing a vaccine for this new virus. These three vaccines have undergone all of the necessary steps prior to emergency use approval by the FDA.

You may wonder how study participants are evaluated for efficacy. Are participants exposed knowingly to COVID-19? The answer is no; study participants volunteer knowing they will either receive a placebo (a dose of intramuscular saline) or the vaccine under evaluation. The study participants continue on with their daily lives following government guidance and are asked to report symptoms each week including if they contract and are tested positive for COVID-19. In the end the research groups compare the cases (both number and severity) of COVID-19 in the vaccinated group to the placebo (control) group and determine efficacy based on these calculations.

The only way for us, as a human race, to slow the spread of this virus substantially is to choke it out. We have to give it fewer hosts to live in; fewer susceptible people; fewer people lacking antibodies. If the virus cannot find a susceptible host to live in, we will slowly regain control. The only way to ensure you are not a susceptible host is to either be vaccinated or be infected with the virus. Yes, the vaccine may have short-term side effects like headache, fatigue, muscle soreness and in some cases fever and chills, these symptoms signal that the body is recognizing the vaccine target and producing antibodies. The side effects of the vaccine are far less serious and much more short-lived than becoming ill with COVID-19. Doctors are now reporting that many patients who experienced even mild cases of COVID-19 are displaying other more serious conditions as an after-effect of the virus. The benefits of the vaccine far outweigh the mild side-effects that have been reported by many who have received it. As the CDC continues to collect data, guidelines continue to change. Most recently, the CDC

reported that you can relax some of the masking and social distancing guidelines two weeks after the final dose. And even more importantly, you are removing yourself as a susceptible host for the virus. Furthermore, new reports suggest there is some cross-protection, against the new variants of the virus too. So the sooner we can choke this virus out, the less likely new variants will form and the more quickly we can return to life pre-pandemic.

Another very common question I am asked is “which vaccine should I get”. My short answer is “whichever one they offer you”. Johnson & Johnson offers a one-shot vaccine while the other two require a booster 3-4 weeks later. The data shows us that any one of them is better than none. If the choice was given, the efficacy of the Moderna and Pfizer vaccines would make me select one of those. However, it is very important to remember that although protection against disease was less with the Johnson & Johnson vaccine compared to both Pfizer and Moderna, it was 85% effective at protecting against severe disease and death.

With vaccine roll-out, we are inching towards “herd immunity” which indicates that 70-90% of a population (community/state/country) have achieved a desirable level of protection either from being infected or being vaccinated. One author stated that many discussions treat herd immunity like an on-off switch, where in fact it’s more like a dimmer switch. Estimates suggest that approximately 40% of Americans have some protection against COVID-19; the light is getting brighter! I would much rather be vaccinated than chance the long-term effects of infection.

The million-dollar question is “should I get the COVID-19 vaccine?” When farming is your livelihood and knowing it could put you out of work for days, weeks or even longer, the risk seems too large to not consider vaccination. For me personally, I chose to be vaccinated for a variety of reasons. I chose vaccination to

remove myself as a host for the virus, to slow the spread in order to give our doctors and nurses a break from their grueling days/months/year in the ICU, to greatly reduce if not eliminate my ability to unknowingly pass this virus to someone else whose body can't fight it, so I can see my parents again and most importantly because I trust the science that is behind these vaccines related to the safety and efficacy of the products.

Alternative Mastitis Treatments

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Mastitis is one of the most common diseases occurring on dairy farms worldwide, with corresponding treatments responsible for most of the antimicrobial usage on the farm. Mastitis can be caused from a variety of different bacteria and can spread due to the environmental conditions or from improperly cleaned milking equipment. Mastitis costs producers on average \$356 per case due to lost milk and the cow's treatment, among other reasons. With more research, protocols have emerged on farms to limit the potential of spread within the herd. When cows are dried off, they are treated with an intramammary antibiotic infusion followed with a solvent that is used to seal off the mammary gland from bacteria that could enter through the teat end. Dry-off therapy is effective in preventing new and eliminating existing infections that occur during the dry period.

Bacteriocins are produced by bacteria and can have inhibitory activities towards other bacteria. There are four distinct classes that define their composition and mode of action. Historically, bacteriocins have been used as food preservatives/additives, but research is

being expanded to include use as a replacement for antibiotics. Staphylococins, bacteriocins produced from *Staphylococcus aureus* and *Staphylococcus epidermidis* in this study, were found to inhibit a range of *Streptococcus agalactiae* and *S. aureus* strains, some even more effective when combined for a synergistic effect. A nitric oxide releasing solution is another developing antimicrobial treatment that showed reduction of *S. aureus* and *Escherichia coli*. However, the use of this treatment may cause a temporary increase in the somatic cell count (SCC) after treatment, but overall, further research needs to be performed on a larger sample of clinically mastitic cows. Lastly, photodynamic therapy for the treatment of subclinical mastitis can be easily implemented in the milking routine at the farm and it is not necessary to discard the milk from treated cows. Photodynamic therapy was shown to influence a reduction of *Streptococcus dysgalactiae* and coagulase-negative staphylococci, however it was not effective against *E. coli*. Photodynamic therapy and nitric oxide are important treatments to investigate because their withdrawal times are 0 to 24 hours, which upon clearance of infection, milk can be sold—unlike the longer withdrawal times needed for antibiotics.

To conclude, there are promising antimicrobial treatments emerging for mastitis other than antibiotics. Further research is needed to investigate the *in vivo* effects of these treatments and ensure there are no negative effects on the cows treated. The cost effectiveness and ease of use on the farm are important factors to consider as well, since this drives the decision of the farmers in product use.

Upcoming Events

Virginia Spring Dairy Show
May 1, 2021

Show like a Pro Workshop
May 15-16, 2021

Franklin County Livestock Show
June 12, 2021

June Dairy Month Baseball Game
June 17, 2021

Virginia Dairy Expo
July 9, 2021

Virginia Summer Holstein Show
August 7, 2021

Hokie Cow Classic
Coming Fall 2021
Date TBD

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