



Positive disruption of animal vaccines is our mission

Mazen Animal Health, Inc. is a biotechnology company transforming corn seed into the future of animal vaccines. We have produced proof of efficacy data in two vaccine candidates, each addressing a significant unmet need. By creating vaccines to be delivered orally with animal feed, we will disrupt the animal vaccine market in four distinct ways: **(1) cost effective vaccines - removing the economic thresholds that control the vaccination decision today; (2) a safer method of vaccine administration for both animals and workers; (3) improved vaccine efficacy allowing for reduced antibiotic use; and (4) vaccines with a global reach because of ambient temperature stability and ease of delivery.**

Mazen's platform technology enables the expression of antigens in corn seed and disrupts the standard vaccine manufacturing cost structure. These safe subunit antigen vaccines protect the animal two ways, creating mucosal and systemic immunity enabling the potential to be more efficacious than current injectable vaccines. Corn seed containing antigen is ground into meal, formulated into the appropriate dosage form and included into animal feed.

Mazen's experienced team has delivered on the angel round milestones: expression and production of two vaccine candidates, proof of efficacy in animals, positive meeting with regulatory authorities - reaching agreement on the product development plan, and favorable feedback from our customers in market research.

Mazen has an exclusive license to over 15 issued and pending patents covering the core technology. In addition, Mazen has filed a patent on Porcine Epidemic Diarrhea Virus, (PEDV). Our strong core team encompasses research, development, manufacturing and commercialization with specific plans to grow the team at close of the Series A financing.

Under angel round funding, Mazen has developed two vaccine candidates with proof of

concept data and is now raising a bridge round of \$500k-\$1M to complete a dose ranging sow study. Mazen will then raise a \$7-9M Series A to continue development of the product candidates to pre-registration and initiate development of additional product candidates. The Series A will enable Mazen to focus their initial market entry on oral swine vaccines for PEDV and Porcine Circovirus, (PCV). Valley fever vaccine development will continue to approval with plans to commercialize through a partner.

Market Opportunity:

The global animal vaccine market is over \$7B with double-digit growth, using traditional vaccination. Vaccination prevents disease which in turn can result in decreased antibiotic use, desired by both regulatory authorities and consumers. Mazen's vaccines offer an opportunity to expand the existing market and increase the vaccination rates by overcoming many of the obstacles currently limiting vaccine use in animal health. Producers are seeking cost-effective ways to decrease disease and increase productivity.

Market research with veterinarians from top swine producers has further defined our product profile for the PEDV and PCV vaccines. The swine market is concentrated, making a B2B product launch strategy achievable for a small to mid-size animal health company. Internationally, we will use a key customer strategy to maximize our sales in key geographies, reducing the number of approvals needed to achieve our sales goals.

The fungal disease, Valley fever, is a regional play in the Southwest of the U.S. and Latin/South America. We plan to launch in the U.S., Latin and South America through a commercial partner.

Based upon current product development plans and the financial projections, Mazen's global revenue is projected to reach \$35M in 2024, enabling over a 10x multiple in valuation from Series A.

Product Development:

Mazen met with the USDA Center for Veterinary Biologics, the regulatory authorities overseeing vaccine registration, and reached agreement on the product development plan and the treatment of this technology as a platform technology.

With angel round funding and an NIH grant, we have produced two vaccine candidates – for PEDV and Valley fever. PCV vaccine development will initiate in 2020. Two additional products are in development under SBIR grants for coccidiosis in chickens and pancreas disease in fish.

PEDV causes 100% mortality in newborn pigs and can cause significant losses in farrowing barns. In addition, endemic infections slow weight gain in older pigs, extending the time to market. While a conditional PEDV injectable vaccine is available, it has shown limited efficacy and requires labor crews to individually vaccinate each pig, therefore causing low utilization. Mazen has developed a vaccine candidate which can be dosed with feed, creating a cost-effective, safer to deliver solution for producers. In our proof of concept study, young pigs dosed with the Mazen PEDV vaccine and challenged with disease showed high titers of neutralizing antibodies in serum, indicating protection. One of the world's largest swine producers is enthusiastic about the prospect of incorporating Mazen's PEDV vaccine in its production system.

PCV causes weight loss, growth retardation and can lead to death. PCV vaccines are broadly utilized today due to the availability of the vaccines and the negative impact of the disease. Mazen's vaccine technology will provide significant cost savings and improved system efficiencies over the current injectable vaccines.

Valley fever is a fungal infection that leads to disease not only in humans but also dogs, cats, horses, and other mammals. With 12 million dogs in the southwestern United States at risk, cases of Valley fever are increasing and can be very costly and can cause severe lung, spleen and bone infection, often leading to death. In Arizona alone, it's estimated that Valley fever costs dog owners at least \$60 million per year.

There is no vaccine for Valley fever; Mazen's candidate is a breakthrough and first of its kind anti-fungal vaccine. In lab animal testing, the Mazen vaccine elicited a biomarker response correlative with protection and reduced the burden of *Coccidioides*, the fungus that can cause Valley fever.

Leadership Team:

The Mazen team has a unique combination of breadth across biotechnology and depth in animal health. Together their mission is to create positive disruption in the animal vaccine market, delivering unmatched value for producers.

Dr. Jenny Filbey, CEO, high energy entrepreneur focused on commercializing products which shift treatment paradigms; led teams and worked with biotech/pharma/animal health emerging companies to commercialize assets

Dr. John Howard, Board Chair, a world leading expert in protein production in maize grain.

Kerryann Kocher, Strategic Marketing & Commercial Operations, has extensive expertise in swine and poultry marketing, with leadership experience at both Elanco and Bayer Animal Health.

Dave Morrison, Head of Finance, has in-depth public and private company experience in healthcare, SaaS software/eCommerce, professional services and logistics industries

Ronan Molloy, Executive Board Member, seasoned animal health executive with global experience from start-up to top animal health companies

Team expansion is planned with additions of R&D Head, Veterinarians, Production & Quality.

Board of Directors: Terry Speizer, MBA; Ronan Molloy, JD; Kelly Lechtenberg, DVM, PhD; John Howard, PhD, Jennifer Filbey, PhD

Advisors: Dick Hesse, Ph.D.; Jack Moyer, MBA, Tom Overbay, DVM

Bottom Line:

Profitable in 5 years with over 10x return.

Endless possibility for vaccinating animals worldwide, providing more plentiful and cleaner protein to the world.

Better quality of life for animals.

Contact:

Jennifer A. Filbey, Ph.D., CEO
jfilbey@mazenanimalhealth.com
256-417-8568
www.mazenanimalhealth.com