

Animal Health Industry Response to COVID-19 and the Rise of Telemedicine

July 2020

www.kisacoresearch.com/AnimalHealth

Produced by:

Kisaco
Research

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Foreword



Calan Smith, *Portfolio Director, Animal Health, Kisaco Research*

“The animal health industry in 2020 is experiencing a tectonic shift. While still feeling the lingering effects of the African Swine Fever virus, the industry is now faced with the personal and professional impact of a global COVID-19 pandemic, as well as a societal awakening in light of recent events in the United States, leading to the Black Lives Matter movement. The result has been an unprecedented level of accelerated change within the industry, leading to new directions and scenarios that we have outlined in this report.

Over the last five years at Kisaco Research, we have been committed to giving the animal health business community a platform where we can come together, create vital strategic connections and drive deal making and investment. In this new climate, our commitment has not changed and on June 23-25th this year we launched our first virtual animal health partnering summit, Animal Health Investment One. The event brought together 216 attendees from 21 countries, generated 570 confirmed meetings and a whopping 2,434 chat messages. It was a great experience for us and a step forward as we look to deliver, not just vital connections but critical business intelligence to the community.

Our industry reports are something I am very excited about. In creating this new, in-depth analysis our goal was to understand the full impact of the outbreak, across all players in the ecosystem, and provide the sector with a summation of industry surveys, data collection, KOL discussions, and interviews with market leaders and emerging companies, focused on the animal health industry in the world of the COVID-19 epidemic. We received insight from 55 experts across the sector, transcribed over 10 hours of conference discussion and conducted 42 interviews that are referenced in this report.

As we started this process one thing became abundantly clear and that was the importance and growth in the veterinary telemedicine business. This has become a critical delivery method for veterinarians during the outbreak and regulations have been eased to enable the technology to be implemented, causing years’ worth of growth and accelerated adoption for the industries top providers. However, key questions remain around the opportunity for remote prescription and the approach to the technology post-COVID. We have therefore dedicated a significant portion of this report to addressing telemedicine and have interviewed the world’s leading authorities on the subject.

I sincerely hope you find this report useful; we have put a lot of time and effort into making it as comprehensive as we possibly can. I want to explicitly thank all the individuals that contributed, either directly through interviews, or through their commentary at Animal Health Investment One.

I wish you and your families all the best at this time and look forward to seeing you face-to-face very soon.

Best regards,

Calan

With special thanks to:



Carel du Marchie Sarvaas
Executive Director
Health for Animals



Dave Ross
Chief Executive Office
Agri-EPI Centre Ltd



Daniella Dos Santos
President
British Veterinary Association



Tony Zilong Tan
Founder and Managing Partner
Z-Link Biotech Co. Ltd.



Simon Doherty
Senior Vice President
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Yuki Ujimasa
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Tony Simpson
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Luiz Luccas
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Lydia Kinkade
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Gudrun Ravetz
Head Veterinary Officer
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Report Summary

Emerging Areas of Interest in Animal Health due to COVID-19:

CONSUMER TRENDS

- Point of care diagnostics
- Pet insurance merging with telehealth offerings
- E-commerce
- Sustainability
- Food transparency
- Safety and traceability
- Food supply waste
- Nationalism
- Demand for preventative products and alternative medicines
- COVID as a catalyst for existing trends
- Education of pet owners to value veterinarian care

LABOR

- Labor shortages
- Skills gap
- Automation
- Integration of technology into practices and companies

POLICY

- One health policy development
- Food protectionism

RESEARCH AND DEVELOPMENT

- Telemedicine
- Renewal of old vaccine platforms
- Effective scientific communication
- Veterinarian business model changing from selling products to services
- Increase investment in robotics and automation (R&A) for livestock
- One health diagnostics
- Precision livestock farming
- Veterinary medicine inventory and sustainability
- Animal health recovery is faster than predicted

STRATEGY

- Manufacturing dependencies
- Shortening of the supply chain
- Investors focusing on portfolio companies
- Resiliency strategies from small to large



Our Predictions

- The US will suffer a skills gap in highly educated graduates as immigration policy has toughened and international students who have moved to online classes are in jeopardy of deportation.
- The UK will suffer skills gap in high quality crop and animal husbandry laborers as lockdown restrictions limit movement of workers and Brexit immigration policies enact December 31, 2020.
- Telemedicine regulations and restrictions will be changed globally to allow for more consultations with a focus on teletriage and teleprescribing.
- There will be transformations in animal husbandry as robotics and automation will take precedence over human labor for sustainability and biosecurity reasons.
- There will be an increase emphasis on food supply chain sustainability and food waste globally.



Recruiting for talent is at an all-time high with extremely well qualified individuals being furloughed or looking for a different career path. Now is the time to be hiring, not firing.

- There will be a demand for veterinary services and representatives to be tied into national frameworks and within crisis planning to create an interdisciplinary One Health approach.
- Risk communication and crisis communication should be overhauled to be globally palatable and consistent. This is a huge area for opportunities and innovations.
- Pet owners have grown more attached to their companion animals during this time and have become more concerned with their own health and their pet's health. This will translate to an increase in how much owners will be willing to spend on their pet's care.
- Preventative and wellness products will see a surge in demand such as antibiotics alternatives, nutritional products, specialty therapeutics, vaccines, digital offerings, devices, and diagnostics. A greater emphasis will be on building a human's or animal's own immune system so a pandemic or zoonotic disease does not have as devastating of an event.



There will be advancement of technologies on the farm such as diagnostics, remote monitoring, biosensors, and teleconsulting and with the e-commerce surge of pet products, veterinarians will have to change their business models from selling pharmaceuticals to selling consulting services.

OUR PREDICTIONS

- The trend of telemedicine in the veterinary industry was catalyzed by the pandemic. Adoption of technology has happened more in the past three months than what has happened in the past three years. There are differing viewpoints on whether it will stay at this level, with 60% of experts agreeing it will remain.
- Innovations which can provide resiliency (i.e. better bounce back from a disease) and resistance (i.e. better defense for a disease) will be on the radar for all governments, companies, and funds.



Many of the investors we heard agreed that cashflow and runway are two of the key financial aspects they are concerned about both with their portfolio companies and new opportunities.

- The most repeated phrase heard during interviews was “COVID was only a catalyst for trends in the making”.
- Traceability and local sourcing of food will see an increase across geographies and countries withdraw their manufacturing dependencies.
- Alternatives to meat protein has seen a spike during COVID based on consumer’s awareness of health and impact on environment and because of lack of access to normally consumed goods in the grocery store. This segment was already growing before COVID and has been greatly accelerated.
- If vets can position themselves to sell their knowledge as “reassurance”, that is what the pet owners are searching for and are willing to pay for; especially in the time of COVID.
- It is predicted the source of imported beef in Japan will shift from the United States to Australia if the meat prices continue to rise in the US.
- Globally, there has been an increase in veterinary products and pet food being sold directly to consumers through online channels.



Animal health insurance companies are strong backers of telehealth as it can be integrated into wellness packages and there are cost saving opportunities. We should see an increase in partnering of these segments and offerings to become extremely client focused.



All experts agree there will be an absolute need for POC testing for human health and animal health moving forward. The One Health initiatives will be focused on the monitoring, identifying, and treating of diseases which can be made possible for POC diagnostics for both segments.

Headline points per chapter

Telemedicine

- The EU is more apt to adopting telehealth in their veterinary clinic than in the US, where only 30% of clinics have adopted telehealth into their practice.
- Pet owners who were in the middle of training courses are now trying to figure out how to work with trainers remotely, so their pet does not regress. In fact, there have been more total users in this segment in the last 4 months than in all of 2019 combined.
- A change in characteristics of new pet owners as the tendency to insure and visits vets are vastly different than seasoned pet owners.
- Veterinarians need to know they are not risking their license and liability on a digital recommendation. Technology solutions must be creating systems that are easy to use, fully integrated, and can change a vet's practice with the most minimum disruption in current operating procedures.



There is a propensity for insurance companies to support telemedicine. Insurance companies would rather utilize the offerings of a clinic which could provide teleconsultation services 24/7 and could act as a triage service.

- Headlined by almost all the veterinarians interviewed was the value proposition of telemedicine. All leading experts agreed that telemedicine should be positioned to add value to the veterinary practice, and not purely focused on increasing client share.
- Even though the dairy market in the US dropped 10-20% as a response to COVID, farmers were still deploying technology and even a slight increase of usage as farmers now had time to sit back and reevaluate the data presented to them. Even in a cash flow pinch, the farmers and producers still wanted technology.



Some experts predict the surge in telehealth will not last past the pandemic. There is some data that suggests as soon as pets can go back into clinics the veterinarians will drive traffic back. It was noted there is a behavioral, cultural, and educational shift that must happen in the veterinary industry.

- There has been a significant increase in prescription management and online pharmacies where chronic medication has been moved almost entirely online through e-commerce or through home delivery services. Specially in chronic care, there has been a 53% increase in adoption suggesting veterinarians are leaning into their technology to take care of their patients.
- There will be restructuring of wording and interpretations of what an animal "under your care" means to veterinarians.
- There will not be one "winner" in the telehealth space, as different geographies will need different models.
- One of the unique value propositions telemedicine offers that the veterinary industry is notorious for struggling with is flexibility.



If vets can position themselves to sell their knowledge as "reassurance", that is what the pet owners are searching for and are willing to pay for; especially in the time of COVID.

HEADLINE POINTS PER CHAPTER

Geographies

CHINA

- There was a low supply issue in veterinary products in China before COVID that stemmed from environmental restructuring and the Chinese New Year.
- In China, animal health companies are having to adjust their sales projections by -30%.
- China was already restructuring their farms to meet GMP standards due to ASF outbreaks which caused over \$140 billion in losses. COVID has catalyzed those efforts and has forced farmers to make biosecurity a key component of new building designs and animal husbandry.
- In March 2020, over 60% of pet health-related inquiries were made via online platforms during the pandemic. Almost 35% of the 1,986 respondents claimed their pets had health problems throughout the outbreak, with the three most common complaints being gastrointestinal issues, skin diseases, and obesity.
- A critical success factor of animal health companies breaking into the Chinese market is the recruitment and retention of local talent which have a deep understanding about the highly segmented animal health industry.

BRAZIL

- The Animal Health industry in Brazil was outpacing that of the general market pre-COVID, creating a buffer for the industry during the pandemic.
- Pet food sales are not being significantly impacted in terms of volume, however, there has been a trend of owners flipping from premium pet products to average products.
- E-commerce platform adoption has increased in demand and adoption for the animal health industry, specifically for the large animal sector.
- A key differentiating factor in veterinary practices in Latin America versus the rest of the world is the use of social media to interact with pet parents. In fact, over 122 million Brazilians are on social media, making up 87.7% of the country's total internet population. Since most Brazilians use social media, it has become a popular mechanism for veterinarians to reach their clients.
- Due to the enormous toll ASF has had on the swine industry in China, the cattle industry in Brazil has increased supply to fill that protein void. This resulted in Brazil rising in the ranks to becoming the number one beef exporter in the world: reaching an estimated 1.8 million tons or \$7.5 billion worth of exports in 2019.

JAPAN

- Imports of chilled beef from the US have fallen sharply and the source of imported beef will shift from the United States to Australia if the meat prices continue to rise in the US.
- Japan was able to quell COVID outbreaks by avoiding the three C's: crowded spaces, closed contact, and enclosed spaces.
- Due the lack of PPE and veterinary medicines, Japan has created a stimulus package of over \$2 billion to decrease its dependency on China.
- The number of pets in Japan has been declining since 2009 by 33% for dogs and 10% for cats. In 2018, Japan's dog population sat at 8.9 million.
- Sales of animal health products in 2018 came to \$1.14 billion with the biggest category of veterinary drugs in Japan being biologicals, followed by antimicrobials/anthelmintics and non-therapeutic products which was 32%, 27%, and 18% of the market sales, respectively.

HEADLINE POINTS PER CHAPTER

Large Animal Health Companies

- IDEXX shifted their business model to offering more education through webinars as well as installing instruments in clinic remotely using video and other tools, which will now be part of their service offerings post COVID.
- In the US, during the period of lockdown dog walking was up 25%.
- Academic institutions are going to have to evolve where future leaders get their learning which is going to be especially trying for those who will have to have hands-on practicum such as veterinary students practicing surgeries.
- Experts agreed that they will be focusing on e-commerce referencing Chewy.com as one of the most impressive examples. However, it was emphasized that there is still a large portion of sales that happen in clinic where 50-60% of Zoetis' product portfolio is administered.



An area all companies are focusing on is preventative care as well as renovating old platform technologies; specifically, Elanco is interested in RNA and DNA vaccines.

- IDEXX claimed they are keen to look into POC diagnostics along as it meets two requirements: 1. It compliments what is being done with the veterinarian and 2. Must be able to be integrated into the practice management software.
- Virbac said its immediate priorities in the next 6-12 months are focusing on the supply of customer, supporting the community, and protecting their margin.
- All agreed the veterinary industry is rebounding quicker than expected.

Start Ups



All the startups agreed that one of the most important factors which has allowed them to remain functional is because of their contingency planning.

- Differences in the US and the EU was the ability to rally together as a community of startups and lobby government. For example, the UK BioIndustry Association (BIA) which is a lobby group for SMEs was able to present a case to the government that they should stay operational to continue developing solutions against the Coronavirus.
- All startups agreed having strong investors backing your company is mission critical to a small company.
- COVID-19 presented the companies with chance to not pivot away from what they were doing but to pivot to a new opportunity. Advanced Animal Diagnostics claims they developed the fastest white blood cell differential test for animals and humans which was used to test workers for COVID-19 in meat processing plants.
- In light of COVID-19, animal health has the unique opportunity to teach human health how herd immunity works and the importance of vaccinations.
- CROs which normally take months to get a trial set up had freed up space where trials were set up within weeks. This has expedited some startups timelines and could be a unique positive from COVID-19.

HEADLINE POINTS PER CHAPTER

Investors



The biggest change in the investment process was that the due diligence process has become more stringent and startups are being held to a higher standard.

- A key opportunity lies in examining genetics to predict disease and using biodevices to diagnose.
- Two key milestones investors want to see now, which they may have been more lax on before, is being past a working prototype stage and having some validation of product-market fit.
- All investors agreed that cashflow and runway are two of the key financial aspects they are concerned about both with their portfolio companies and new opportunities.
- Key lessons learned from the meat processing side of the industry during COVID-19 was the three Ps: preparation, production, and use of personal protective equipment (PPE).

- The number of deals in animal health has dropped by 21% from this same time last year. From January-June 2019 there were 88 deal compared to only 33 by June 2020.
- The further you move towards the customer (i.e. distributor, vet profession, customer) will be more impacted by COVID which could change certain buying behaviors and patterns.
- Animal health innovations will be more attractive now as it is easier to de-risk innovations that are able to go straight into the target species, which takes much longer in human health.
- Investors are less willing to spend money on long R&D projects and are looking for quicker “wins”.
- Fundraising can be hard now as investors are more concerned with keeping their portfolio companies functioning than recruiting new ventures.

Veterinarians

- Turnover in farm animal practices:
 - Beginning: 47% of farm animal practices reported a 26-50% decrease in turnover
 - End: 41% of farm animal practices reported a 26-50% decrease in turnover
- Turnover in small animal practices:
 - Beginning: 48% of small animal practices reported a 51-75% decrease in turnover
 - End: 51% of small animal practices reported a 26-50% decrease in turnover
- Turnover in equine practices:
 - Beginning: 65% reported a 75% decrease in turnover
 - End: 53% reported a 51-75% decrease in turnover



There has been a surge in adoptions around the world for “Pandemic Puppies” and “Corona Kittens”.

It is uncertain what the effects will be as pet owners return to work and children to school.

- There will have to be a fundamental shift in business models for veterinarians. Conventional veterinary businesses gain most of their income by selling high margin items like pharmaceuticals, however, in the world of telehealth - expertise, knowledge, and advice are the selling features veterinarians were utilized for most.
- Telemedicine is a part of the veterinary industry; defining what that means legally and where the value lies for each clinic will be crucial in the upcoming months.

HEADLINE POINTS PER CHAPTER

Veterinarians *continued*:

- Even though most of the veterinarians graduating are women (almost 90% of the industry) most of the key decision makers and leaders in the industry are male.
- Mental health and flexible working solutions for veterinarians are a place animal health companies need to put resources.
- The key piece about reassurance was echoed in several interviews with veterinary colleagues and seems to transcend practice sizes and segments in the veterinary industry. Pet owners were looking for reassurance from vets, and vets were leaning on each other and their industry association for their reassurance.

CROs, Large Corporates, and Associations



There is heightened awareness of disease spread and the pandemic has underlined the importance of animal health including the importance of the human-animal bond.

- One of the most active and pivotal working groups formed has been the OIE Wildlife Working Group which has issued statements about reducing “spill over” events (i.e. SARS and Ebola virus) while also promoting welfare and biodiversity.
- It is estimated that over 80,000 agricultural workers are need annually in the UK, however, with the COVID-19 restrictions, only 30% of the migrant workers are expected to make it to the UK.
- To date, commercial airline Air Charter Service has flown over 1,200 passengers from Romania to the UK to meet the needs of the UK farmers.
- There is a significant increase in country nationalism by reducing their dependencies and keeping domestically grown food local. For example, because of the impact COVID-19 has had on the food supply chain, within the last 4 months Singapore has declared they will provide 30% of their food products domestically by 2030¹.
- Most manufacturers tend to operate in country silos and sometimes species silos which present problems for large corporates whose value is through variety of clinics, services, and offerings.
- Large agencies such as the Food and Agricultural Organization (FAO) and the World Health Organization (WHO) are creating a new center which is focused on prevention, spread, and monitoring of zoonotic diseases. This could be a key inflection point for the animal health industry, for the first time, the animal health industry will have a seat at the table in crafting new policies globally.
- The animal health industry is vulnerable to difficult economics; however, it is one of the more resilient markets and there is already growth in sales in some markets



Through furloughs, forced layoffs, and individuals having time to reevaluate their careers, there has never been more qualified individuals looking for work than there are currently. Now is the time to be hiring people, not firing them.

¹ <https://www.straitstimes.com/lifestyle/food/grow-local>

Telehealth in the Veterinary Industry

With commentary from:

Victoria Johnson
VetCT

Zubian Bhattay
Fuzzy Pet Health

Mark Boddy
PawSquad

Roy Stein
Babelbark

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Georgia Wraight
Covetrus

Paul Koffman
Merck Animal Health

Matt Dobbs
Destination Pet

Tony Tan
Z-Link Biotech

Luiz Luccas
V2PET

Yuki Ujimasa
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TELEHEALTH IN THE VETERINARY INDUSTRY

When putting this report together it was clear that there was one topic on the top of everyone’s mind from investors, to large corporates, to veterinarians and startups. Whether it was on the chat box of a panel of experts or questions submitted by audience members, everyone and their dog wanted to know about and had opinions about telemedicine. This became such an overwhelming part of the report it was decided to take the comments we heard from each group and move it into its own headline. As telemedicine visits are forecasted to surge past 1 billion this year for human health, the veterinary industry was predicted to follow suit. Then, the Coronavirus pandemic hit and life as we knew it changed overnight. The veterinary industry and its value chain had to lobby for each of the

differing segments to be deemed as essential to ensure veterinary medicines, animal care, and the food supply continued. This became even more clear as the focus on zoonotic diseases and One Health has a bipartisan role with the animal health industry finally having a seat at the table. We saw governments across the world loosens restrictions around the industry to allow for quicker movement of medications and veterinarians to teleconsult with animals they had not seen before. Although this was necessary for economic stability and animal welfare during this unprecedented time, the question remains: What happens next? Below are the responses we have collated to try and summarize what the leading experts had to say about this catalyzed segment of the animal health industry.

Customer Adoption of Telemedicine

Before the Coronavirus, the veterinary industry was slow to adopt telehealth solutions. There were numerous driving factors but the three main ones that were heard over and over again was that pet owners did not have issues getting access to veterinarians, clinics were not equip to integrate technology into their offerings, and veterinarians were concerned with liability surrounding remote consultations. Victoria Johnson, Director of VetCT, said that within the first few weeks of COVID, she saw a rapid change in veterinarian’s behaviors. Her company launched a campaign where all vet clinics could access online specialists 24/7 five days a week. They saw 17 times their normal registrations and had to recruit 53 extra specialists to meet demands. Victoria highlighted it is not just the pet owners wanting reassurance, but it is the veterinarians wanting it as well and her company’s platform offers that reassurance. Echoing this was CEO of First vet, David Prien, who said they have seen 40-50% increase in month over month volumes of consultations, with most of the interests coming from smaller veterinary practices looking for alternative ways to conduct business. Jessica May, UK Lead Vet at FirstVet, said they are approaching 25,000 consultations per month across the business as a whole, with 5,000 consultations per month being in the UK. One of the unique value propositions

telemedicine offers that the veterinary industry is notorious for struggling with is flexibility. Jessica said, despite other clinics shutting down entirely and furloughing staff, FirstVet has been operating normal hours, expanding, recruiting staff, and even offering veterinarians more work during the lockdown. Their platform allows vets to give advice and triage patients and since COVID hit, they are seeing 5 to 6 times more patients than before. Jessica said there will be a growing demand for clinics to provide telemedicine services in the future and navigating the who, what, and how will need the most attention moving forward.

Roy Stein, CEO of Babel bark, agreed stating they have seen a drastic change in pet owner usage of their platform moving from once a month to 10-12 interactions per pet per month. Roy said it is like a “grass roots” movement with pet parents reaching out to vets and trainers wanting to maintain contact that they used to have routinely. A key insight Roy revealed was that pet owners who were in the middle of training courses are now trying to figure out how to work with trainers remotely, so their pet does not regress. In fact, they have seen more total number of users in this segment in the last 4 months than in all of 2019 combined.

TELEHEALTH IN THE VETERINARY INDUSTRY

Zubin Bhattay, CEO and Founder of Fuzzy Pet Health said they have also seen an increase in utilizing their digital platform where normally they see 2.5-3 times usage rate on a per pet basis. Now they are seeing double that with the most frequent inquiries requesting information about vaccinations, training, behavior, and anxiety. Zubin says this is a unique selling opportunity for vets as pet parents are clearly seeking expert advice for recommendations of their pet's care. He highlighted, if vets can position themselves to sell their knowledge as "reassurance", that is what the pet owners are searching for and are willing to pay for; especially in the time of COVID.

On the livestock side, David Prien mentioned that his company offers their services via partnerships with farmers for which they have seen a direct surge in usage. He said this is due to the fact they offer this service through strong domestic partners in country which owns a large portion of the market and the needs of large animal vets, which travel more, have been limited. David said they have seen growth rates in usage for farm animal consultations in the hundreds of percent. On the companion animal side, David said a key insight they have seen has been the change in characteristics of pet owners as there has been a surge in first time owners. These pet parents have not had pets before and the tendency to insure and visit the vet clinic are vastly different than seasoned pet owners.

When it comes to customer adoption, Roy said, *"The train has left the station in adoption of telemedicine or telehealth going forward. Pet parents have already seen that for some cases, for triage or small questions, they can work with telemedicine from their armchair at the hours that they like."*

Zubin agreed saying the two main challenges which are driving telemedicine are:

- 1 **FRICION**
 - a. Going to the vet requires time, logistics challenges, and cost
- 2 **FREQUENCY**
 - a. One human year is equal to 7-9 years in dogs
 - b. Not sufficient frequency in vet visits
 - c. Preventative care can lead to longevity in animals

Telemedicine is creating pathways for pet parents to engage with veterinarians, to get advice, and obtain some level of treatment with less friction. Zubin said this will not substitute for in person of care, but on the spectrum of care there are some segments that can transition into the digital realm. For veterinary use, Zubin claimed *"Telemedicine is not just putting a veterinarian in front of a chat interface or video and providing some level of information. That is not telemedicine. There needs to be some structure around monitoring, engagement, data capture, e-clinical framework, and ongoing care that actually involves how care is delivered and how a pet parent is going to receive that information to make the right decisions about their pet's life"*.

Mark Boddy, CEO of Pawsquad, agreed and said if a pet owner has a burning question about their pet's health, it is much easier for them to go to "Dr.Google" versus taking a day off work and coming into the clinic. This is where Mark says the value of telemedicine lays, allowing the veterinarian more billable events and increasing interactions with pet owners while providing accurate advice and care for the animal.

TELEHEALTH IN THE VETERINARY INDUSTRY

Investors and Telemedicine

When asked about telemedicine from an investors standpoint, Tony Simpson, Senior Business Development Advisor at TechAccel, pointed to the human health industry as a good example of how there have been numerous companies emerge that claim to have the “end all be all solution”, however, not many have been able to gain a great deal of traction. The main reason telemedicine has been slow to catch on in the human health industry and the veterinary industry is because one must switch the mindset of two different audiences: the health care provider and the patient or pet owner. This is a behavioral shift that must be driven by both sides and, most importantly, must be supported by governmental regulations. The human side has allowed Medicare and Medicaid to pay for coverage and major 3rd party payers have made telemedicine a part of their offering as customers are wanting simplicity and ease of access to their health care provider. Though large strides have been made on the human health side of telemedicine, the animal health side of the equation has been reluctant to switch over.

Several factors for this push back are:

- Education about tools available and training on how vets can incorporate into their clinic
- Value proposition is not clear on the digital tools available
- Regulations and prescribing rights vary from country to country and state to state
- Access to veterinarians has not been identified as an issue for pet owners who are not going to the clinic
- The veterinary industry has traditionally been slow to adopt new technologies into the clinic
- Getting the pet owners buy-in with the technology available and its benefits
- Pet insurance and coverage
- Lack of integration into a practice management system (PMS)

The biggest hinderance to adoption, Tony noted, was the grey areas around telemedicine in actual practice. One of the biggest concerns with veterinary telemedicine is consulting with an animal that veterinarian has never examined in person.

When it comes to prescribing, Tony noted one of the main differences between human health telemedicine and animal health telemedicine in the end run is the patient. A human can verbalize what they are feeling whereas an animal cannot, and the vet must go off of non-verbal cues to aid in a diagnosis and treatment. This turns into another discussion when looking at telehealth with a livestock lens. For example, could a veterinarian diagnose and prescribe medicine to a dairy cow based on video alone? Tony said with the right platforms and the right regulations, this will eventually come to fruition; the rate limiting factors will be amending regulations and market adoption.

Another advantage to telemedicine in the veterinary industry is the opportunity to increase efficiencies within a practice. If a pet owner is at home doing a Teleconsult with a vet, they are less likely to miss appointments which also opens a new door for pet owners who may not be mobile due to age, disability, or transportation reasons. The key factor behind making this model successful is for veterinarians to have comfort knowing they are not risking their license and liability on a digital recommendation. Tony noted, innovations in this area particular will be of the utmost importance moving forwards by creating systems that are easy to use, fully integrated, and can change a vet’s practice with the most minimum disruption in current operating procedures. Tony also highlighted that there is a triage element which could make practices more efficient by being able to make quick decisions on whether to bring an animal in immediately or the next day. This gives better care to the animal, peace of mind to the pet owner, and veterinarians can better use their time and judgement in emergency

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cases which may or may not need to be addressed quickly. Making a triage system that is seamless for veterinarians and how to drive engagement and compliance with pet owners will be a unique value proposition for startups and large animal health companies to solve.

Another segment of the telemedicine innovation opportunity is creating a system that notifies the veterinarian when patients are ready to be seen in the new “normal”. As it stands, many clinics are not able to have waiting rooms due to social distancing measures. Current practices are pet owners make an appointment, pull into the parking lot or in front of the clinic and a technician retrieves your animal and brings it inside for a virtual consultation. An innovative opportunity for startups would be to create a streamlined system which sends a notification to a cell phone when it is time for the pet to be seen. The vet tech comes to your car and collects your animal which is placed in a room with

a veterinarian that has a camera set up that can be streamed to the cell phone. The vet can see the animal and consult with the pet owner remotely achieving the same result before the pandemic, however, meeting all the new standards of social distancing and biosecurity. If a technology were developed to streamline this process, they would offer value immediately to the veterinarian, staff, owners, and pets.

Rob Readnour, managing director of Mountain Group Capital Partners, commented that the adoption of technology that allows people to have healthcare where they live, work, and play has accelerated more in the last three months more than they have in the past three years. Rob also said with the extra time at home, people are more willing to try things that they otherwise would not invest time in learning about or trying such as telemedicine.

Large Corporates, Associations, and Telemedicine

Carel du Marchie Sarvaas, Executive Director of HealthforAnimals, explained there are two sides to telemedicine that he has seen: 1. The need for telehealth options for veterinarians and pet owners and 2. The adoption of that technology. This is a unique struggle in that not all veterinarians and not all pet owners like telemedicine as the medium for interaction. This makes it difficult for the larger animal health companies to push offerings forward in this area as the buy-in from their target audience is varied. Carel also mentioned there is a fine line between prescribing and diagnosing and how far that can be taken without a veterinarian seeing the animal in person. Also, the veterinary structure, associations, and regulations differ from country to country, which can majorly impact the how certain technologies are implemented. For example, in Italy the veterinary association is not an advocate of telemedicine because most of the clinics are very dependent on the human relationship with the pet owner for up selling of higher margin products. With the implementation of telemedicine, the face to face contact is gone and the added fear of additional

costs to implement the technology create a market which is not open to telehealth. Overall, Carel said his association sees the need and the appetite for telehealth solutions in animal health to grow during this time. In the richer countries, the association saw the regulators becoming more flexible and willing to change policies. For example, digital certificates are needed to transport goods in and out of countries and were traditionally hard to come by, but when the Coronavirus hit, the regulators accelerated the process to obtain those certificates and relaxed laws regarding freight movement.

Richard Fairman, CEO of CVS Group, revealed that his company has grown from doing very little teleconsultations to being a significant part of how they are able to offer services and that telemedicine will become part of his company. Richard echoed earlier comments about how it is more complex in the veterinary industry as animals are non-verbal and hands-on interactions are pivotal for veterinarians to be able to properly diagnosis an animal, however, some aspects like general questions or advice have the ability to be

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virtual. In addition, there is a large trend in the feminization of the veterinary industry where nearly 85% of the veterinary graduates are female. Richard noted that the industry must adapt to more flexible ways of working and believes that remote teleconsultations offer that flexibility while also giving great client service. Another key aspect Richard shared was the propensity for insurance companies to support telemedicine. For example, if a client is faced with going to an out of hours center for pet care, they will be paying higher consultation fees which is an expense the insurance companies would have to cover. Insurance companies would rather utilize the offerings of a clinic which could provide teleconsultation services 24/7 and could act as a triage service. Richard said that the CVS Group has developed an in-house technology for teleconsultation services with the idea that video consults is the best mode of delivery, however, a majority of their veterinarians and clients

reported the consultations are working well with just a simple phone call. From an e-commerce perspective, the group has its own online channel for pet medication, pet food and pet supplies called Animed Direct. Nearly 25% of the small animal practice sales are of their own brand medicine with the aim to continue to grow that arm of their business.

From a regulatory perspective, Klaus Hellman, CEO of Klifovet, said telemedicine will be a tricky field to navigate as systems only work well if there is no fraud and this can only be achieved if there is a highly regulated market. He raised some concerns about the possibility of people offering services that they may not be qualified or insured for as being a big barrier to adoption and regulatory concern.

The Veterinary Profession and Telemedicine

Telemedicine, telehealth, and teleconsulting are currently top of mind to the animal health and pet owners alike, however, leading veterinarians in the industry elaborated that this digital offering of veterinary services has been on the rise for the past five years and has only been accelerated with the Coronavirus pandemic. Overall, the profession has seen a significant uptick in remote consulting whereas before most practices were hesitant to utilize technology, now over 90% of the veterinary clinics in the UK have reported using some form for remote consulting. This has been driven by force due to the strict regulatory guidance given during lockdown, but also because of the relaxing of regulations surrounding remote prescribing of medicine. Daniella Dos Santos, President of the British Veterinary Association, noted that the UK is the only country in the EU who was granted that flexibility and that some veterinary practices are not keen to continue after the pandemic is “over”. Gudrun Ravetz, past BVA President, highlighted the new client loyalty is convenience, and for telemedicine to enhance this standard it must meet three points:

- Self-Serving
 - Without face to face interactions there needs to be a platform that clients can log onto
 - With furlough of support staff vets do not have the capacity to serve those clients
- Frictionless
 - Must be seamless and integrated into workflow
 - Must have good user interface and easy operability
- Accessible
 - Must be available 24/7 and aid in triaging

One key insight that was headlined by almost all the veterinarians interviewed was the value proposition of telemedicine. All the leading experts agreed that telemedicine is being used to add value to the veterinary practices and it is not about increased client share. Many of the telehealth or telemedicine platforms which are marketed towards veterinarians have the aim of increasing revenues and client acquisition. The veterinarians we spoke to were adamant that was

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not what vets were looking for and innovations in this space with that dogma were not meeting the needs of the veterinarian or pet owner. Georgia Wraight, Executive Vice President of Covetrus agreed, that they have also seen an increase need for technology solutions to continue care, offering different ways to run the practice, not driving additional revenue. Covetrus, which owns 60-65% of the veterinary market share in the United States, released a telehealth platform to their customers which easily integrated into their workflow as a direct result of COVID. Now, some of their veterinarians are doing 100% virtual visits and others are doing partial virtual visits where the pet owner stays in the car and a technician brings the pet inside where a teleconsult happens. Another key point Georgia made was the significant uptick they have seen in prescription management and online pharmacy, where chronic medication has been moved almost entirely online through e-commerce or through home delivery services. Specially in chronic care, the Covetrus team has seen a 53% increase in autoship adoptions; really nailing home the point that veterinarians are leaning into their technology to take care of their patients.

Paul Koffman, Global Marketing Director for Ruminants Merck Animal Health, highlighted how their recently acquired Antelliq business has showcased technology adoption in diary and the shift of focus on labor. As you will read later in this report, large concerns are growing around labor shortages in the livestock animal segment as immigration policies are changing due to pre-COVID-19 issues, such as Brexit and US policy reform, and post-COVID-19 issues, such as travel restrictions. Paul says one of the best solutions available to address this labor shortage is the use and implementation of technology and automation in the animal health industry. A key insight that Paul shared from Merck was that even though the diary market in the US dropped 10-20% as a response to COVID, they still saw farmers deploying technology and even an increase in usage as farmers now had time to sit back and reevaluate the data presented to them; discovering new insights. Paul says this goes to show that even in a cash flow pinch, the farmers and producers still want technology.

Georgia claimed Covetrus never intended to go into telehealth but felt obligated to serve their veterinary community with the EU being more apt in adoption of technology than the US where only 30% of clinics have adopted telehealth into their practice. To date, Covetrus claims they have hosted over 4,000 virtual visits.

Matt Dobbs, Practice Leader of Digital Technology at Stonehaven Consulting, had a differing view that adoption of telemedicine is driven by legislation. For example, in the United States each state governs policies around veterinary care. This gets murky as a veterinarian in Texas must have a client patient relationship formed before the vet can administer care via a telehealth platform, however, in New York, the regulations are more relaxed and a veterinarian doesn't need to have that relationship formed in order to do a remote consultation. Matt says this inconsistency throttles the adoption rate of telehealth; however, he hopes that things will change as a result of COVID-19.

Another key insight that Matt pointed out was the reduction in telehealth he predicts will happen "after" COVID-19. Stonehaven has seen data which shows that as soon as pets can go back into the clinics, the veterinarians are keen to drive traffic back. Matt noted that there is a behavioral, cultural, and educational shift that must happen in the veterinary industry as some vets haven't found the appropriate use case for telehealth, are afraid they will lose contact with the client, fear clients will find other vets, or believe revenue streams will not be maintained. Supporting this point, UK equine veterinarian, Silvia Janska, claimed as soon as the rules were relaxed and clinics were able to open, all telemedicine ceased in her clinic and no more remote work was done.

Daniella offered a counter point as to why telehealth may decline after COVID-19 in the UK which was focused not on the vet as the driver but the pet owner. She claimed that if the profession is not using appropriate platforms, they can deliver unsatisfactory services. The time which could be wasted on getting the right video or picture of an animal to send to the vet is not worth it to the pet owner and they would rather walk into

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the vet's office and be seen in person. Daniella highlighted again how important it is for solutions in the veterinary telemedicine to be able to offer integrated systems and value of service as their core competencies. The real controversy about telemedicine in veterinary care circles around 1. Remote triage 2. Remote consultation and 3. Remote prescribing. Daniella stressed that solution providers should not be offering a facility to prescribe remotely, rather should be focused on enhancing care given.

Apryle Horbal, CEO and Founder of VetNow, said their partnership with Elanco to offer virtual care has been driven by the evolving customer need. Apryle said that not only has the interest in telehealth been accelerated because of COVID, but even before there were nearly 74 million cats in the United States where more than half were not receiving veterinary care. Apryle says innovative solutions like teleconsulting gives the pet parents choices while giving the veterinarian flexibility. Nearly half of pet parents say they feel uncertain about the care they are giving to their pets and by utilizing telehealth platforms, veterinarians can create "stickier" more loyal clients by increasing vet visits from the current 1-2 times a year. This can create more billable events for the vet as well as increasing medication and treatment

compliance. Apryle said that telehealth is an interconnected journey that allows for increased capacity, improvement of clientele retention, improvement of preventative care, and better animal welfare by being able to detect issues earlier on. Due to the Coronavirus lockdown restrictions, the AVMA reported that nearly 98% of vet offices are limiting physical contact with owners and over 76% of pet owners have moved to buying food and medications online. In a separate study, Apryle said that vets which utilize telemedicine sale 25% more ancillary products such as shampoos and pet pill pockets. Telehealth consultations were also found to increase engagement by 40% are pet parents were more likely to schedule appointments in person for the next three months.

Kristin Bloink, Vice President of Global Research and External Innovation from Elanco, and Julia Loew, Vice President of Marketing for Companion Animals from Elanco, both agreed that their decision to partner with VetNow was a critical factor to serving and supporting their customers during this uncertain time. Moving forward, both said they expect to expand their offerings and give veterinarians alternatives to continue running their practices while meeting their patients' needs either physically or remotely.

Defining "Under our Care" for Telemedicine

Another key point which was addressed during the forum specific to telehealth was the wording and interpretations of what an animal "under your care" means. A veterinary professional has a responsibility to animals under their care and are regulated as such. The Veterinary Medicines Regulations do not define the phrase "under your care" and so the RCVS has interpreted it to mean²:

- the veterinary surgeon must have been given the responsibility for the health of the animal or herd by the owner or the owner's agent
- that responsibility must be real and not nominal
- the animal or herd must have been seen immediately before prescription

- recently enough or often enough for the veterinary surgeon to have personal knowledge of the condition of the animal or current health status of the herd or flock to make a diagnosis and prescribe
- the veterinary surgeon must maintain clinical records of that herd/flock/individual

Though telehealth consultations may meet these points, a follow up clause states: "A veterinary surgeon cannot usually have an animal under his or her care if there has been no physical examination; consequently a veterinary surgeon should not treat an animal or prescribe POM-V medicines via the Internet alone".

² <https://www.rcvs.org.uk/setting-standards/advice-and-guidance/code-of-professional-conduct-for-veterinary-surgeons/pdf/>

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The term “usually” gives enough wiggle room to offer the flexibility which was seen during the pandemic. If this will be continued moving forward remains to be seen. Many vets feel like the clients are not receiving value in the remote consultation alone, rather, it is the whole offering of veterinary clinic. The definition of “under our care” is currently going through a review with regulators at RCVS and BVA which leans towards a vet patient client relationship cannot be established remotely alone and if the animal has been seen before by the vet, there is an argument for remote prescribing. This, however, could be different in the farm sector, as the consultations and/or prescriptions are not usually about one animal alone, rather, a herd or a flock. Gudrun shared that as of June 30th, the BVA extended its guidance on remote prescribing to at least August 6th, where another review would be conducted with the assurance that practices will be given at least three weeks’ notice of any change³.

Simon Doherty, past BVA President, said the RCVS has been more guarded about the legal definition of “under our care” as it would require a “hands-on relationship” with an animal. This is easily understood for face to face interactions with companion animals as normally it is one to one, however, it could come into question how does this translate to 50,000 chickens in a

chicken house which do not all need hands-on interaction to be “under care”. Simon says this will be an area that has to be broken down into a granular level with segmentation on teleconsult, teleprescribing, teletriage and telehealth. One key insight Simon gave was he believes there will not be one “winner” in the telehealth space, as different geographies will need different models. For example, a telehealth model which may work in Norway, where a veterinarian can carry out a remote diagnosis on an animal they have not physically seen, may not work in the UK. Simon suggested the telehealth model in the UK, outside of lockdown restrictions, would be better positioned to offer reassurance for pet owners with a vet that has seen their animal before such as chronic care monitoring, general advice, renewing existing prescriptions, or check-in appointments. This gives the vets more touchpoints with their patients, strengthening the vet-client relationship, and improving pet care and medication compliance. Simon also highlighted the complementary side of technology in the vet clinic, which is to someday be able to integrate data capture from pet wearables, pet owner monitoring and biosensors to create actionable insights, such as how much is a pet being walked. This could not only have implications for animal welfare but human health as well.

Veterinary Telemedicine Around the World

TELEMEDICINE IN CHINA

Tony Tan, founder and managing partner at Z-Link Biotech, said there has been a significant increase in veterinarians using technology platforms for remote consultations. Use of technology has been integrated into the Chinese way of life for decades, with massive online retailers such as the world’s largest e-commerce website TaoBao and the \$500 billion Chinese multinational technology company Alibaba taking over the online retail space. Following naturally, is iChong, an online platform developed to serve the veterinary clinics with an emphasis on companion animals covering over 10,000 vet clinics in China, representing

over 50% of the market share. Tony said the surge of telemedicine started before COVID, but the pandemic has sped up businesses and pharmaceutical companies to put more of their product online where consumers are choosing to spend their dollars. For example, Virbac, where 80% of revenues come from companion animal product sales, have set up an online system to promote the sale of pet products in China. Tony said the vets in China have been able to shift their business model during the pandemic to not just offer products but to also sell trainings and education modules as well as incorporating

³ <https://www.rcvs.org.uk/news-and-views/news/rcvs-covid-19-taskforce-extends-remote-prescribing-guidance/>

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database management software. Tony says vets are not able to do teleprescribing at this time, however, they are using the platforms for selling and promoting of pet products.

Over 100 million Chinese households include a pet with the pet market reaching over \$28.2 billion in 2019: up 44% from 2014⁴. This rapid increase in pets has led to an increase in the demand for veterinary services which is predicted to

TELEMEDICINE IN BRAZIL

Telemedicine in Brazil has been a hotly debated issue for the past few years. Luiz Luccas, Co-founder at V2PET, revealed that there have been two major proposals submitted through the Brazilian senate and congress to restructure regulations surrounding veterinary applications for telemedicine.

Veterinarians were able to show that through the use of teleconsultations, veterinary medications were able to be distributed quicker than in-person interactions. The main bottleneck that was identified was the lack of legal framework in place to sustain these occurrences. A key differentiating factor in veterinary practices in Latin America versus the rest of the world is the use of social media to interact with pet parents. In fact, over 122 million Brazilians are on social media, making up 87.7% of the country's total internet population⁵. As an example, Public Animal Shelter in Rio de Janeiro allowed people to check the profiles of available cats and dogs via social media,

TELEMEDICINE IN JAPAN

Yuki Ujimasa, President of AHRMS, Inc, noted that the Japanese government does not allow veterinarians to teleconsult with an owner if that pet has not been seen by the vet before. Guidelines for veterinary telemedicine are currently being prepared by Japanese regulators and there are a few companies that provide veterinarians with telemedicine systems in Japan. Some veterinary hospitals have been proactive during the pandemic and have created their own telemedicine systems. According to Dr. Aki Miyake of AniCli24, his company is a

become a requirement for the clinical veterinary industry in the near future⁵. A survey which was published in March 2020, found that over 60% of pet health-related inquiries were made via online platforms during the pandemic. Almost 35% of the 1,986 respondents claimed their pets had health problems throughout the outbreak, with the three most common complaints being gastrointestinal issues, skin diseases, and obesity.

then delivered the chosen pets to their new owners⁷. Since most Brazilians use social media, it has become a popular mechanism for veterinarians to reach their clients. Most vets use Facebook owned messaging application, WhatsApp, to send messages and receive pictures of animals. Luiz highlighted two main concerns veterinarians have with telemedicine which are the legal and practical aspects of remote consultations. To date, the law in Brazil states that a veterinarian must have physical contact with an animal before teleconsulting and it is illegal to prescribe medication virtually. What most vets are doing now is using platforms like WhatsApp to write updates for continuous medications or give general advice. Luiz says if regulators can create guidance for veterinarians to use telehealth technology it will be quickly accepted as most of the population is used to interactions via a technology platform like WhatsApp or social media.

leading teleconsultation business in Japan. With access to over 10,000 pet owners, the number of consultations has increased by 60% when comparing May 2020 with May 2019. Some of the main concerns pet owners were calling in with were "I am scared of COVID-19 and I cannot bring my pets to an animal hospital" or "My veterinarian has instructed me not to bring my pet in unless there is an emergency". Yuki claims there is a huge opportunity for technology integration in Japanese veterinary clinics to triage animals and make quick decisions on when and if to bring pets into the veterinarian's office.

⁴ <https://www.cbndata.com/report/1719/detail?isReading=report&page=4>

⁵ <https://www.sixthtone.com/news/1005556/chinese-vets-promote-telemedicine-for-pets-during-pandemic>

⁶ <https://www.translatemedia.com/translation-services/social-media/brazil-social-media/#:~:text=As%20of%202017%2C%20Brazil%20is,%2C%20placing%20penetration%20around%2066%20%25.&text=According%20to%20a%20report%20by,internet%20users%20in%20the%20country.>

⁷ <https://www.theguardian.com/world/gallery/2020/may/29/rio-animal-shelter-delivers-pets-to-brazilians-in-lockdown-in-pictures>

Geographic Impact of COVID-19 in Animal Health

With commentary from:

Tony Tan
Zlink Biotech

Luis Luccas
V2PET

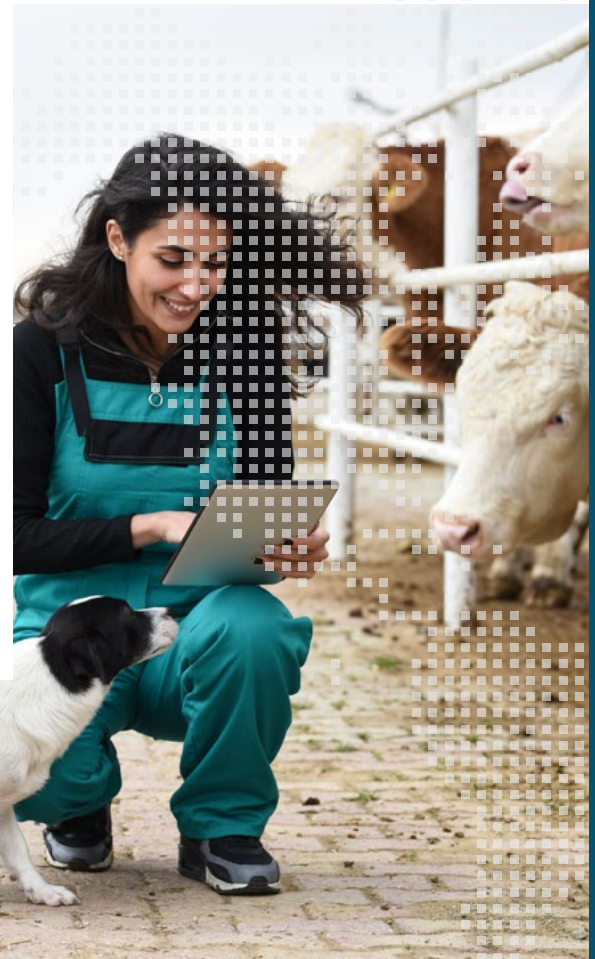
Yuki Ujimasa
AHRMS, Inc.

Although not all, most of the interviews that were conducted had an emphasis on the European and US animal health markets. With the global impact that COVID-19 has had, we found it important to get input from animal health industry experts around the world.

Since the detection of SARS-COV-2 first emerged at wet markets in Wuhan, China has experienced a rollercoaster of responses. One of the key lessons from the Coronavirus epidemic which transcends borders has been those who were already vulnerable are the ones who are most likely to be the severely impacted. These people, especially smallholder farmers, have less capacity to cope with the consequences of an outbreak both in terms of medical care and social protection. Nearly 230-250 million people represent the smallholder farmer population in China and due to lockdown restrictions, most farmers are expecting a 20-40% decrease in income⁸.

As of July 2020, Latin America and the Caribbean has become a hotspot of the Coronavirus pandemic, which has only been exacerbated by weak social protection, fragmented health systems, and inequalities. It is estimated that the economic impact of COVID-19 will result in the worst recession in the region in over a century, causing a 9.1% drop in regional GDP in 2020.

⁸ <https://www.ifad.org/en/web/latest/blog/asset/41949073>



GEOGRAPHIC IMPACT OF COVID-19 IN ANIMAL HEALTH

This could increase the number of poor up by 45 million totaling 230 million: putting them at risk for undernutrition⁹.

Japan managed to control the spread of SARS-COV-2 relatively well compared to other countries across the world through their “cluster strategy” which identified clusters of infections and shut them down such as night clubs and gyms¹⁰.



However, they were still forced to make a tough decision by postponing the Tokyo Olympics until July 2021. Nearly 50% of businesses have switched to primarily teleworking and more than 63% of companies project that COVID-19 will have negative impact on their business performance¹¹.

After the World Health Organization (WHO) declared the SARS-COV-2 outbreak a public health emergency of international concern by January 30, 2020 and a global pandemic on March 11, 2020, the virus has spread to over 188 countries, resulting in over 14 million cases and deaths reaching near 600,000¹². Each country had different strategies for handling the outbreak which ultimately determined how hard they would be impacted economically. Below is a summation of representatives from three areas of the world to give a firsthand account of how the animal health industry is coping regionally.

Impacts on China

Tony Tan, founder and managing partner at Z-Link Biotech, said the Coronavirus has had negative impacts on the animal health industry in China all throughout the value chain. China is a major supplier for pharmaceutical raw materials and some companies in Europe have struggled getting supply through freight and cargo as movement between China, Europe, and US is limited. As a result, there has been a shortening of supply and the cost has increased.

The direct impacts have been the shutdown of animal health product manufacturing and transportation of those products. This stems from low raw material supply and rigorous travel restrictions in place for workers to travel to their jobs. As a result, there is an issue for delivery of the veterinary products to the farms and clinics which affects the sales and performance of those

businesses. COVID has only exacerbated low stock levels of products, which had already existed from the end of 2019. At this time, there had been environmental restructuring and operations were low creating a short supply of raw materials. Unfortunately, this happened around the same time as the biggest holiday in China, the Chinese New Year. Before COVID hit, the factories had already shut down in preparation for the holiday.

Tony also noted that transportation restrictions has halted promotional activity for most animal health companies. The sales teams can no longer travel and are no longer able to reach the customer and hold educational meetings or conferences. Tony says the only companies doing well are the companies which have disinfectant products.

⁹ <https://reliefweb.int/report/world/policy-brief-impact-covid-19-latin-america-and-caribbean-july-2020>

¹⁰ <https://www.sciencemag.org/news/2020/05/japan-ends-its-covid-19-state-emergency>

¹¹ <https://www.weforum.org/agenda/2020/04/japan-covid-19-situation-and-coronavirus-impact/>

¹² <https://coronavirus.jhu.edu/map.html>

GEOGRAPHIC IMPACT OF COVID-19 IN ANIMAL HEALTH

Tony highlighted indirect impacts have affected the farms, slaughterhouses, and clinics as they were not allowed to open. There were very few exceptions in some provinces where the farms had special permission to maintain production at a lower capacity to keep the food supply sustained. Consequently, some animal health companies are having to adjust their sales projections by -30%. Tony says the industry will slowly recover as the demand is there, only the supply must rebound back. This slow growth is due to the impact of COVID-19 on the Chinese economy and the buying power of the people. Not only has COVID affected business due to lockdown restrictions, but some will have gone out of business entirely with tourism down due to restrictions.

Tony said it will be a slow return to normal as there is a fear from the public about safety in general, with increased concern about the safety of animal

products. On June 17th, reports came out that 137 new cases of SARS-COV-2 were reported to have links to a wet seafood market in Beijing. The testing of the market came back with positive surfaces such as a cutting board in a booth that handled imported Salmon from Norway. Although salmon is not known to be a host for SARS COV2, mass panic ensued where supermarkets and restaurants across Beijing pulled salmon from their shelves and imports from Europe were halted¹³. Now, the Chinese people are wary about eating seafood and meat products in general. In fact, as soon as there were positive tests for COVID at the seafood market, the consumption of seafood dropped immediately resulting in the waste of several tons of fish and seafood. With the fear of food being a transmission source, this will have an impact on the animal health industry as there will be less people eating meat, less demand, and less production.

Trends and Positive Outcomes

Not surprisingly, Tony said one scenario which has emerged has been more online sales, trainings, and conferences. This affects the behavior of the employer and the employees as most are having to work from home. Working from home in Chinese culture is less common than in the US or EU, where a 2017 poll showed 43% of US workers worked remotely at least some of the time. In addition, the organizational culture of Chinese companies is traditional in that they want employees managed in an office building for work. Some concerns that could be seen with more work from home policies is the perpetuation of the “overwork culture” called China’s “996”; where employees work from 9 in the morning to 9 at night 6 days a week¹⁴. Longer term, Tony says he sees there being another wave of restructuring for the animal health industry in China. Some small companies which are not performing well may be experiencing cash flow issues as farmers and clinics may not be able to pay for products

as quickly or in bulk like they used to. These struggling companies will either be shut down, acquired, or merged with larger players who have the funds to sustain themselves. This is an add-on effect for those in the swine industry who are suffering from the \$140 billion loss ASF has estimated to have. These producers must implement new GMP regulations mandated by the government that requires the vaccine companies to do new renovations to become compliant and to implement surveillance testing. Tony says COVID-19 has only emphasized the need for improved biosecurity measures on farms and how it has catalyzed the pace of restructuring within the industry. This has made the companies more organized and more focused on innovations for longer term sustainment. Tony said he believes there will be more emerging diseases in the future which will require the industry to be equipped, and COVID-19 has been on big exercise to get prepared.

¹³<https://www.bbc.com/news/world-asia-china-53089137>

¹⁴<https://www.bbc.com/worklife/article/20200309-coronavirus-covid-19-advice-chinas-work-at-home-experiment>

GEOGRAPHIC IMPACT OF COVID-19 IN ANIMAL HEALTH

African Swine Fever Update

Tony says although you do not see ASF in the news as much because the world's attention is on COVID-19, it is still present and affecting China's swine producers. Since mid-June China has been experiencing heavy rains and flooding in the Southern provinces; reigniting new cases of ASF. To date, Tony says ASF outbreaks have declined due to improved biosecurity, hygiene, and smaller herd sizes, however, the weather has seemed to change things for certain areas. Although it is not known yet what caused the resurgence, it is hypothesized that since farmers usually bury infected pigs, the virus may have spread through ground water¹⁵. Vietnam has also struggled with controlling its ASF outbreak which started in early 2019. By December of last year, over 5.9 million pigs were culled. This year the spread has slowed,

with over 20,000 pigs culled to date, however, the sow population decrease by 35-45% making rebounding back harder¹⁶. Tony said the cross-border illegal trade could also continue posing a risk to China's swine populations.

On the bright side, the Harbin Veterinary Research Institute has been actively conducting vaccine development and making significant progress in clinical trials. As of June 2020, the vaccine was used in field tests on 3,000 hogs in the Northern provinces of China where vaccinated pigs showed no adverse side effects and had a death rate of less than 1% when challenged with the virus. The institute will continue to conduct trials with aims to speed up R&D to get the vaccine into the industry as soon as possible.

Breaking into the Chinese Market

China has emerged as one of the leading animal health markets in the world, second only to the US. According to the China's National Bureau of Statistics, in 2017 China ranked third in terms of pet ownership where there were over 73.6 million pet owners. Tony said multinational companies who are looking at market opportunities in China need to be cognizant that China is a large country which is highly segmented by provinces and species. Dogs are the most frequently owned species in China and the canine health market in China is estimated to reach \$549 million by 2026¹⁸. In addition, Tony says the competition is high as all the top 10 multinational players have already been in China for over a decade, as well as hundreds of thousands of local players. In fact, more than 40% of the Chinese companion animal market is attributed to the top 5 players: Zoetis, Bayer, Boehringer Ingelheim, Merck Animal Health, and Virbac. Any company wanting to come into China needs to offer innovative products or services and must be able to market to the Chinese people what their differentiation factor is.

Tony said in order for smaller companies to make it in China, they should focus on the long-term strategies. Making profit quick is not the right methodology, as Tony alluded the primary driver of the companion animal health market in China is the trend of owners increasing spend on their pet's health. This is a pattern which is here to stay and one that emerging companies expanding into China should try and take advantage of. Tony also said one of the most critical factors of whether an animal health company would succeed in China is based on recruitment and retention of local talent. By setting up local production facilities they are better able to control transportation and costs associated with manufacturing and distribution. In addition, navigating the legal and regulatory landscape in China has become a science as trade tariffs and political discussions intensify with larger markets such as the United States. It is imperative companies have local employees who understand importation challenges as well as exportation issues and are compliant with Chinese regulations.

¹⁵ <https://www.reuters.com/article/us-china-swinefever-floods/china-floods-blamed-for-fresh-african-swine-fever-outbreaks-idUSKBN24B0ZF>

¹⁶ <https://www.feednavigator.com/Article/2020/04/14/ASF-being-contained-in-Vietnam>

¹⁷ <https://www.nationalhogfarmer.com/animal-health/chinas-asf-vaccine-shows-progress>

¹⁸ <https://www.datamintelligence.com/research-report/china-companion-animal-health-market>

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Impacts on Brazil

The Latin American market is a key component in the animal health industry as it contributes a significant amount of protein production and is the 3rd largest market globally for animal health. In addition, this region is the 3rd largest market for pet care and Brazil, in particular, is home to over 58 million dogs and 27 million cats.

One key concern which has been addressed by the FAO and Economic Commission for Latin America and the Caribbean (ECLAC), was recommendations to prevent COVID-19 from turning into a food crisis. With the projected sharp drop in GDP, increase in poverty, and the rise in food prices, the region is trying to take actions to make sure the most vulnerable populations in Latin America and the Caribbean avert a food crisis¹⁹. To address these needs, the FAO and ECLAC have worked together to establish programs which support smallholder farmers and ensure that food supply chains are being maintained.

Luiz Luccas, co-founder at V2PET in Brazil, says the large animal health sector in Brazil has not been as impacted by COVID-19 as it is still growing 7-8% even today. Part of this is due to the need for beef in countries hit hard by ASF like China. Normally, the companion animal industry outpaces the livestock segment in Brazil's economy, however, the cattle industry is now outpacing all segments.

Another concern which was seen in countries like Columbia, was the increase in the number of pet desertions. Due to fake news and panic from misinformation, people have been abandoning their pets. This has caused an increase in pet food prices and difficulty in access to products. Stray animals which also relied on humans feeding them scraps are now searching for food as the normally busy streets are now empty²⁰. This has caused concern as hungry stray animals may take more aggressive methods to get food putting human and domestic animal lives at risk.

Trends and Positive Outcomes

Luiz said COVID has impacted Latin America in different ways and that his company saw a slump in sales in May. Although somewhat concerning, they did see a drastic increase in online sales with some groups reporting a surge as high as 50% sales increase overnight. Outside of e-commerce, Luiz says most animal health companies in his area are predicting a drop in sales of nearly 20%. Specifically, in Brazil, the animal health companies are more likely to suffer greater than other areas in Latin America, as the Brazilian government has put in some of the strictest quarantine measures globally, extending past 100 days. This not only affects businesses being shut down but also the recovery of businesses as well, creating a double-negative economic pressure. Interestingly, Luiz said although some businesses stayed open during the lockdown, people were not going out of their homes and fears about public safety kept

businesses empty. For the Brazilian animal health market, Luiz suspects it should improve by the end of the year normalizing to pre-COVID numbers.

Luckily, the animal health industry in Brazil was somewhat buffered during the pandemic in comparison to other market sectors. Luiz said in the last 3-4 years, the animal health industry in Brazil was outpacing the market, leaving some room to spare in terms of growth and sheltering the industry from huge economic impacts. A trend which was observed globally was the increase in animals being adopted out of shelters in Brazil. Although some pets were being deserted, those which were already in the shelters were able to find homes. This is a positive long-term growth factor for the industry and will aid in the recovery of the sector as there will be more pets to feed, train, and vaccinate.

¹⁹ <http://www.fao.org/americas/noticias/ver/en/c/1287949/>

²⁰ <https://www.reuters.com/article/us-health-coronavirus-latam-animals/latin-america-animal-lovers-rush-to-aid-pets-abandoned-amid-coronavirus-idUSKBN21P1WS>

GEOGRAPHIC IMPACT OF COVID-19 IN ANIMAL HEALTH

Luiz said that he has seen pet food sales not being significantly impacted in terms of volume but since people have lost jobs and income, there has been a trend of owners flipping from high premium products to average products.

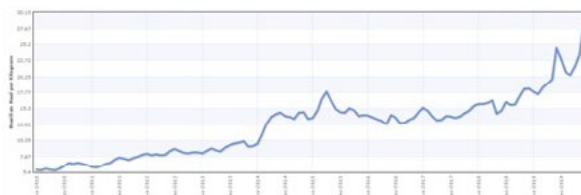
Another apparent trend has been the incorporation of e-commerce into the pet industry in the Brazilian market. Previously, there was resistance to switch to the virtual platform with pushback coming specifically from distributors. Luiz commented there was a large amount of fear that e-commerce would affect the prices or competitiveness of the industry. However, now consumers and companies are now demanding incorporation of digital solutions for their businesses, resulting in record high levels of technology adoption in the industry as whole but most impressively in the large animal sector.

For example, Bayer developed a large animal sector B2B e-commerce platform which has been very successful in Brazil. One positive outcomes Luiz predicts will be the increase in efficiency for distributors for reaching the customers quicker. He predicts that local and regional distributors will increase in the adoption of e-commerce platforms in their sales systems. Overall, B2B and B2C platforms have been the “winners” in the animal health sector. To put numbers on it, Luiz said that in 2019 the US has 20% of its pet sales revenues come from e-commerce compared to Brazil at around 7%. With the catalyst of COVID, Luiz estimated that number is closer to 10% for Brazil pet products with general retail business sitting around 6%.

Impacts of ASF in Brazil

To date, Brazil has not struggled with ASF and its swine industry is growing tremendously fast, catching up with its poultry production which the country exports nearly 20%. Due to the enormous toll ASF has had on the swine industry in China, the cattle industry in Brazil has increased supply to fill that protein void. This resulted in Brazil rising in the ranks to becoming the number one beef exporter in the world: reaching an estimated 1.8 million tons or \$7.5 billion worth of exports²¹. This has caused the price of beef to surge in Brazil with an overall price change of 359.37% within the past decade²². Last year alone beef prices rose 36.4% as Brazil increased its exports of beef to China by over 50%.

One of the unfortunate side effects of this price increase has been the shortages of beef faced in the country, as many Brazilians cannot afford to pay the higher prices²³. Luiz said that cattle are growing faster than ever in the last 5 months as the country has been following the strict guidelines and vaccination programs implemented by the government to reduce foot and mouth disease outbreaks in cattle.



²¹<https://www.reuters.com/article/us-brazil-beef/brazils-beef-export-hit-record-prospects-bright-on-china-demand-idUSKBN1YE1TS#:~:text=Brazil's%202019%20beef%20exports%20reached,2.067%20million%20tonnes%2C%20it%20said.>

²²<https://www.indexmundi.com/commodities/?commodity=beef&months=120¤cy=brl>

²³<https://gro-intelligence.com/insights/articles/monitoring-brazilian-beef-supplies-with-gro-as-china-strains-demand#:~:text=Data%20from%20JCI%20China%2C%20an,CEPEA%2C%20a%20Brazilian%20data%20source.>

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Impacts in Japan

COVID-19 has had a major impact not only on the animal health industry but also on Japan's total industry and economy. In 2019, Japan had a record number of 32 million international travelers spending roughly \$45 billion, breaking the previous record for the 7th year in a row²⁴. This number fell by 99.8% in April 2020, as the world underwent robust travel restrictions to deter the spread of SARS COV2. This has had significant impacts in the hotel and restaurant industries as increasing numbers of corporations are filing for bankruptcy. Yuki Ujimasa, President and CEO of animal health consulting company AHRMS Inc., revealed the number of pets in Japan has been declining since 2009 by 33% for dogs and 10% for cats. In 2018, Japan's dog population sat at 8.9 million²⁵. This number has been decreasing because of a variety of factors but the main driving force is the increase in working individuals and an aging population who are not able to walk their animals frequently. Tony estimated that the number of pets will be further reduced due to the distress of the owners caused by the pandemic. However, there is data that the number of pets

purchased at the pet shops has increased in April and May. According to Mr. Takahiko Morikubo, President of Morikubo Yakuhin, one of the largest wholesalers of veterinary medicines in Japan, reaffirmed the importance of a stable supply of veterinary medicines and therapeutic diets to animal hospitals. Due to the social distancing requirements and biosecurity measures being put into place by veterinary clinics, wholesale companies are using door-to-door parcel delivery to animal hospitals to protect their sales staff. Yuki shared that domestic beef production fell 7% in April to May but is expected to rise in the summer as shops and restaurants start to slowly reopen. Imports of chilled beef from the US have fallen sharply and Yuki predicts the source of imported beef will shift from the United States to Australia if the meat prices continue to rise from the US. Japan's production of pork is the same as the previous year and there has been no difference in chicken production and consumption. As was seen globally, meat sales for home consumption in Japan increased by 18% as people are having to cook at home.

Manufacturing Dependencies

According to a survey conducted by the Japan Veterinary Pharmaceutical Association (JVPA), concerns were raised about Japan's reliance on drug manufacturing in China and that other sources, such as India, Spain, and Ireland, should be considered. As many countries have realized they have heavy reliance on overseas production, Japan faced this issue head-on as lack of masks and PPE put them behind in preparing their biosecurity measures. According to Mr. Morikubo, most companies' current management policy was to minimize inventory and increase efficiencies. In the light of COVID-19, the industry is looking to return to the traditional Japanese-style margin of production, which was prevalent 10 years ago, forgoing the "just-in-time" method.

One main concern Yuki shared was the serious issue of out-of-stock animal medicines in Japan. Changes and preparations for the 2nd wave of COVID is not straight forward as many items must be approved by the Japanese Ministry of Agriculture, Forestry, and Fisheries (JMAFF). Changing suppliers and manufacturers of raw materials is an arduous process that normally take 12 months, putting Japan at risk if a 2nd wave occurs. Japanese Prime Minister, Shinzo Abe, and the Council on Investment for the Future have taken strategic measures to reduce the country's dependency on China by implementing a ¥243.5 billion (\$2 billion) stimulus package to help Japanese companies move production out of China²⁶.

²⁴ <https://www.nippon.com/en/news/ntv20200110001/32-million-tourists-visit-japan-in-2019.html>

²⁵ <https://www.petfoodindustry.com/articles/8160-decline-in-dog-breeders-worries-japan-pet-food-industry?v=preview#:~:text=Dog%20ownership%20in%20Japan%20has,the%20dogs%20are%20small%20purebreds.>

²⁶ <https://www.scmp.com/news/asia/east-asia/article/3082629/dependent-china-how-japan-wants-tackle-coronavirus-disruption>

GEOGRAPHIC IMPACT OF COVID-19 IN ANIMAL HEALTH

Trends and Positive Outcomes

As mentioned before, one of the ways Japan was able to decrease the spread of the outbreak in country was to avoid the “Three Cs”:



**Crowded spaces
with many people**



**Closed contact settings such
as face to face interactions**



**Enclosed spaces with poor
ventilation**

An early study found that around 80% of those infected with SARS-COV-2 did not infect others whilst implementing this strategy²⁷. Yuki shared that the veterinary industry in Japan has not been able to differentiate itself from other pet businesses, but the government has defined it as a “socially essential business” and has allowed clinics

to stay operational. Traditionally in Japan, it was not common to make appointments in clinics, however, to maintain social hygiene standards, clinics are mandating appointments to see patients.

According to Mr. Morikubo, B2C business models are now becoming common to distribute veterinary products and pet food, as pet owners are choosing not to go outside.

In addition, there has been a surge of requests asking veterinary medical equipment manufacturers to change their products to fit human needs. Metran Co., a Japanese company which normally makes ventilators for the veterinary industry, has been approached by government officials from the United States, Britain, India and 30 other countries asking if they can switch their production capacity to make human ventilators. The company is considering a system for producing 5,000-15,000 animal respirators which could be retrofitted for humans but will most likely have to consider licensing the product so that it can be mass produced²⁸.

Emerging Infectious Diseases in Japan

When asked about ASF, Yuki said that Japan has not yet had a case of ASF in their swine herds. Earlier this year, the country had an outbreak of classical swine fever for the first time in 30 years at a farm in Okinawa. There has never been a reported case where classical swine fever has been transmitted to humans, however, it is extremely contagious amongst swine and there is no current treatment²⁹. To continue to combat the potential spread of diseases amongst livestock, an amendment was passed on July 1st, for the Act on Domestic Animal Infectious Diseases Control.

This amendment increased the penalty for transporting illegal livestock products into Japan from 1 million yen (\$9,000 USD) to 30 million yen (\$280,000 USD). If it is found a corporation has violated this act, a fine of 50 million yen (\$467,000 USD) or imprisonment for up to 3 years will be imposed. Yuki shared that the Japanese government is focusing on border measures and paying close attention to the new swine flu confirmed in China.

²⁷ <https://www.bbc.com/news/world-asia-53188847>

²⁸ <https://www.japantimes.co.jp/news/2020/04/06/business/corporate-business/japan-animal-ventilators-coronavirus/#.XxRjcygzaUk>

²⁹ <https://www.stripes.com/news/hog-cholera-strikes-okinawa-for-first-time-in-34-years-forcing-thousands-of-pigs-to-be-slaughtered-1.614237>

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The new swine flu strain, named “G4,” is derived from the swine flu H1N1 that was genetically endemic in 2009. In experiments using ferrets, G4 has strong infectivity and is confirmed to grow in human-derived cells. It was also revealed that the seasonal immunity against influenza and the immunity obtained by the vaccine have no protective effect against G4. An antibody test conducted on pig-related personnel in China showed a high positive result of 10.4%.

The average antibody possession rate in other areas than farms is 4.4%. Yuki says it is clear that the pig-to-human transmission has already taken place, but there is still no evidence as to whether the most concerned human-to-human. China’s Ministry of Agriculture and Rural Affairs said the new strain of swine flu virus does not infect or sicken animals easily, combating the study published in late June³⁰.

Breaking into the Japanese Market

When asked about breaking into the Japanese market Yuki said he would welcome animal health companies’ entry into the market as it is the third largest in the world. Yuki has built his career on consulting with companies who are wanting to expand into Japan, who said navigating Japanese traditional business customs can be complicated. Entering the Japanese market in a country-specific and company-specific manner is how Yuki prefers to lead newcomers to the market.

To give some figures to the market, JMAFF and the National Veterinary Assay Laboratory (NVAL,) reported sales of animal health products in 2018 totaling to \$1.14 billion. The biggest category of veterinary drugs in Japan is biologicals, followed by antimicrobials/antihelminthics and non-therapeutic products which was 32%, 27%, and 18% of the market, respectively³¹.

Due to the evolution of the Veterinary international Conferences Harmonization (VICH), the EU, Japan, and US have worked together to harmonize the technical requirements for veterinary product registration. Of course, there is still a high barrier of language differences between Europe, the US, and Japan.

³⁰<https://www.reuters.com/article/us-health-coronavirus-china-pigs/china-says-g4-swine-flu-virus-not-new-does-not-infect-humans-easily-idUSKBN2450DI>

³¹https://www.eubusinessinjapan.eu/sites/default/files/pet_market_in_japan.pdf

The Investor Perspective on Covid-19

With commentary from:

Tony Simpson
TechAccel
United States

Lydia Kinkade
Innovation in Motion
United States

Brian Axe
NovaQuest Capital
Management

Spencer Swayze
Paine Schwartz Partners

Michael Helmstetter
TechAccel

Rob Readnour
Mountain Group Capital
Partners

Marten Goossens
Anterra Capital

Rebecca Hunt
Octopus Ventures

Sarai Kemp
Trendlines Ag Tech

Joost Matthijssen
Nutreco

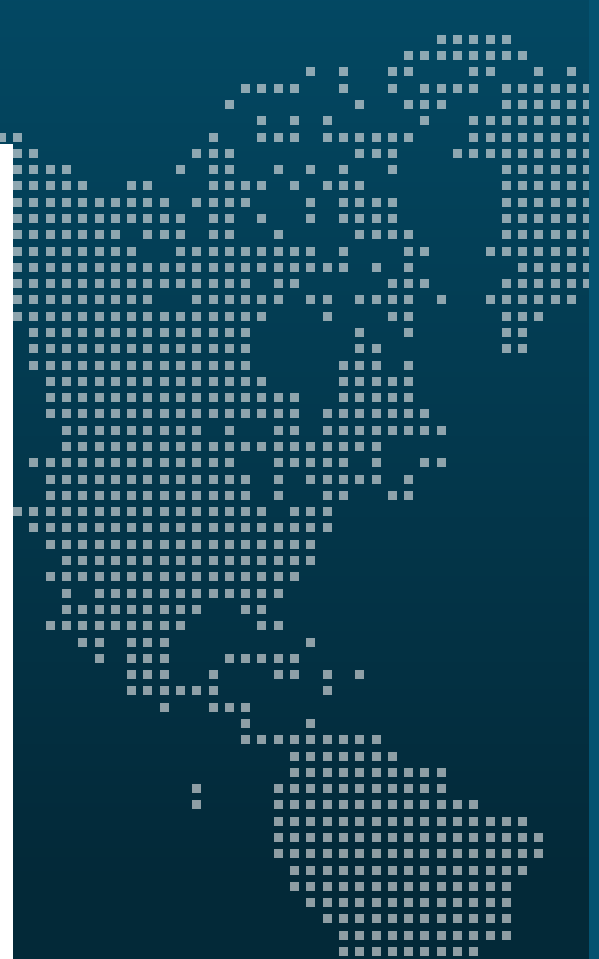
Cindy Cole
Digitalis Ventures

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Peter McCarthy
Stonehaven Consulting

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Stonehaven Consulting



The Next Era of Innovation

Taking a pulse on investment in the animal health industry, Matthias Hofer, Managing Partner of Stonehaven Consulting, said that the number of deals in animal health was growing at a steady pace from 2016 to 2019. However, with the impact from COVID-19, the number of deals from January to June of 2019 vs 2020 has gone down 21%. Matthias said the left side of the value chain (i.e. R&D, manufacturing, sales, and marketing) will have less of a lasting impact because these programs are so established.

The further you move towards the customer (i.e. distributor, vet profession, customer) will be more impacted by COVID which could change certain buying behaviors and patterns. The innovation in animal health has evolved from in-house R&D in the late 1980's to 2020 where there are over 600 startups in the market offering solutions to all angles of the value chain. Most startups the investors are seeing now in animal health have a focus on nutrition, specialty therapeutics, vaccines, diagnostics, or devices.

Fabian Kausche from Stonehaven Consulting noted the key feature which drove the evolution to external innovation was the dramatic decrease in cost of research and innovation, enabling quicker turnarounds for solutions. For large animal health companies, Fabian pointed out they have shifted

from focusing on only offering pharmaceuticals to offering an array of products and services like diagnostics and genetics. Peter McCarthy from Stonehaven also said the model that animal health uses for the continuum of health care is ahead of the big human pharma companies.

The value that lies in connecting predictive genetics to data collection on farm all the way to treatment completes the health care circle and is where efficiencies can be met. Fabian added in light of COVID-19, animal health has the unique opportunity to teach human health how herd immunity works and the importance of vaccinations. Matthias stated that for animal health innovations it is easier to de-risk innovations as you can go straight into your target species, which takes much longer in human health.

Peter discussed how the stock market was rewarding companies that focused on enhancing the customer experience as the online retailer of veterinary food and products, Chewy, was up 77% in valuation from the same time three years ago and has a market cap of \$40 billion. The whole model about enhancing customer experience leads to improved compliance, better medical outcome, and increased revenue which benefits all segments of the value chain.

Investing Appetite

All 12 of the investors that were interviewed indicated that their investing appetite has not changed during this time and has stayed reasonably stable.

One key insight pulled from these interviews was the biggest change in their investment process

was that the due diligence process has become more stringent and startups are being held to a higher standard. Tony Simpson stated, *"Startups that came to us looking like a 6/10 are now not as attractive as we are having to be more cautious about where we are putting our investment dollars"*.

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The investors indicated that their willingness to deploy capital is still the same, however, their investment size may not be as big as it used to be, not because investors are worried about spending money, but that they are having to hold capital back to take care of the companies in their portfolio. Tony noted that most investors are having to prioritize their existing companies in their portfolio making the requirements for newcomers higher.

When asked if the investment amount has changed due to COVID-19, Tony stated “the numbers haven’t changed but the quality has”.

Lydia Kinkade, Managing Director of iiM, pointed out that she has seen her investors becoming more engaged in the meetings and has had a higher attendance versus the in-person meetings, which happen every other month. Traditionally, entrepreneurs were invited to come pitch in person to the iiM group for 20 minutes with a 20-minute question and answer session. Now, the whole meeting is done virtually through a teleconference platform. Lydia believes she has seen higher engagement due to the fact that most people are home instead of travelling and since iiM investors are spread throughout the Midwest region, the ease of logging online versus travelling to Kansas City has allowed investors who may not have been able to join the meetings before, become engaged. Because of the ease of accessibility for these meetings, Lydia has seen investor engagement increase by 30%.

This has also increased the participation in investments, resulting in higher investment amounts than what they have seen in the past. The pandemic has not affected iiM’s investing appetite, in fact, they were able to close a new investment in March and are currently in the process of closing a follow on investment, having invited 3 other companies to pitch to their group since March. As mentioned before, the biggest change in pitching is that it is now entirely virtual which Lydia has noticed that both from the questions asked by the investors and the material presented by entrepreneurs’ meetings are being conducted with intent. Lydia says she has seen an increase in investor participation and a timelier turn around in decision making.

To put figures to paper, Lydia said their normal investment amount is around \$500,000 a year with an average check size of \$200,000. This year, they are on track to invest \$500,000 in new money with two portfolio companies raising two follow on rounds in which they look to participate. Overall, Lydia reviews 300-400 startup companies per year ranging from animal health, agri-tech, and human health.

Out of those startups, the top contenders are narrowed down to 50 where 8 to 10 will be asked to pitch in front on their group and go through iiM’s extensive due diligence process. In the end, the group will go forward with an investment in about 2 investments. Lydia says the biggest killer for high quality startups is either the term sheets or corporate structure, not the IP or team.

Investment strategy

All investors agreed that their investment strategy has not substantially changed during this time, however, innovation areas that might have taken a backseat in the previous 6 months have been shoved into the spotlight now. Some of the key areas of interest are:



In-home care: Veterinarians coming to the home or veterinarian’s teleconsulting in the home

- Telemedicine
 - Platform and integration technologies that add value to the veterinarian’s offerings
 - Liability concerns and regulation requirements
- Point of care (POC) diagnostics
 - At home diagnostics for pet owners for quality of life monitoring, disease progressing, and medication compliance

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- Education systems (training of students in person learning and “hands on” learning)
 - How to prepare vets for real life procedures when they cannot shadow in the operating room
- Going to the vet office
 - From pulling up in car with the pet to vet room visit with diagnosis or prescription
 - Integration into workflow systems and data capture
 - Adaption of waiting rooms or elimination of step from process
- Food safety and supply chain sustainability
 - Traceability and transparency from farm to fork
 - Predicting, monitoring, diagnosing, and treating (Precision Livestock Farming)
 - Plant packing and processing biosecurity and safety

The bigger trends that the investors noted was that this would not be the last pandemic and emphasis from industry, government, and startups should be focused on transmission; whether that be from humans to animals or animals to human in both companion animals and livestock. How to predict what people are going to demand and the new “standards” after the new wears off will be the next forefront of issues to address.

As is true with most trends in animal health, they start in human health first. Brian Axe, Principal at NovaQuest Capital Management, said COVID-19 has pointed out the gaps and opportunities in solutions startups are offering. Some demands that the investors predicted will come from this pandemic are:

- How to validate going to a public place is safe
 - How to ensure safety without compromising privacy?
- Safety at sporting events or other large gatherings
 - Will institutions be liable for outbreaks?
 - How will contact sports be handled and is testing needed?



Conferences and travel: Will companies be liable? Deciding if travel is necessary while keeping relationships strong

- Education institutions
 - How to ensure students are safe and is the academic institution liable?
 - Fundamentally changing the way knowledge is transfers and validated
- Dog parks and other public areas with animals
 - How to ensure pet and human safety especially in cities where space is limited?
 - Will cities and governments be liable?
- Pets and livestock
 - How do we move pets and food across borders safely?
 - How do we ensure our food is pathogen free?
 - Are certain species reservoirs? Or transmitters? Fomites and hosts?

Michael Helmstetter, President and CEO of TechAccel, said COVID-19 has shown a spotlight on biosecurity and infectious diseases, which is an area they have been focused on investing for years. Farmers have already integrated biosecurity measures into their systems from cleaning equipment, to vaccinations, to proper waste management. Michael said he hopes that the pandemic puts an increased awareness on emerging diseases so that viruses like African Swine Fever (ASF), which knocked out nearly 200 million pigs in 2019, can have better innovations and access to more funding³².

Echoing Michael’s responses and the bullets above, Rebecca Hunt, Principal at Octopus Ventures, said people are going to be more aware of their own health, the source of their food, and the health of their food. Rebecca predicted this will translate into the companion animal market as owners being more concerned with their pet’s health and increasing how much they will spend to ensure their pet is receiving the best care. This also encompasses the adoption and acceptance of technology in the companion animal

³²<https://www.newscientist.com/article/2222501-a-quarter-of-all-pigs-have-died-this-year-due-to-african-swine-fever/>

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space which has also been accelerated due to COVID. Rebecca said although they recently sold their last companion animal startup, the fund is closely looking at two livestock companies who have microbiome technologies; another segment of the market Rebecca predicts will only get more attention here on out.

Spencer Swayze, Managing Director of Paine Schwartz Partners, said their investment strategy has not changed and since they placed an emphasis on the livestock and agriculture side of animal health, they were somewhat sheltered from impact in that people still needed to eat and consumption stayed stable. Spencer did note that COVID-19 brought startups to their door which offered different value propositions than what they are used to seeing. The first was high quality companies who were looking to shore up their balance sheets in the uncertain environment and Paine Schwartz focused their efforts on being a strategic capital provider. The second opportunity for the firm was to also help high quality companies who would be looking for a merger or acquisition during this time with Paine Schwartz serving as the facilitator. One of the big segments where the firm has seen a slowdown has been when companies are needing large debt capital that can only happen with syndicate debt capital markets being open.

Investor Concerns

As stated before, most of the investors said their groups are interested at investing at the same level as before COVID-19, however, they are going to be more selective in what they are investing in and more risk averse. Two key milestones Lydia highlighted her investors want to see now which they may have been more lax on before is being past a working prototype stage and some validation of product market fit. She also said it will be important to see what the entrepreneurs have put as milestones, making sure they are still realistically achievable and as well wanting to get to know the company's team better.

Lydia echoed the sentiments above that there has been little to no changes in their investment strategy. *"If anything,"* Lydia said, *"we are paying closer attention to the animal health startups who offer some sort of automation. We saw the struggles with the food producers in the US and it was hard for them to accommodate major change due to the human component of their job"*. Lydia believes there will be an increase in appetite for companies which are focusing on solutions to labor shortages in the animal health and food processing industries. She did note their group would be less interested now on companies which have a lot of research and development, as these are cash heavy investments with usually long timelines. Especially now, when research and clinical or pivotal trials are at a standstill due to biosecurity restrictions. She said her group's interest is now more focused on building short term opportunities rather than longer term R and D plays. Robert Polzer, VP and Head of Global Therapeutics Research at Zoetis, echoed others that innovation in this space is ripe for new combinations. For example, though their monoclonal antibody Cytopoint for dermatitis has been marked as industry blockbuster, it should not be "the end all be all" and that a key opportunity lies in examining genetics to predict disease and using biodevices to diagnose.

All 12 investors that we interview agreed that they are spending more time with the companies which are within their portfolio, having regular calls with the CEOs and helping to develop resiliency strategies. Lydia has seen some of their portfolio companies raising bridge rounds to support themselves during this time, however, a major change has been on how the companies are valuing themselves. For a successful raise, companies are going to have to have realistic valuations and be more disciplined in their timelines and use of cash. One key takeaway all the investors wanted to give to the startups is to not be under the radar. Now is the time to make yourself known and to keep up efforts in terms of news, PR, and staying relevant during a time where attention is fleeting.

THE INVESTOR PERSPECTIVE ON COVID-19

Lydia pointed out her investors have raised concerns about how companies are managing head count and expenses. Many of the investors we heard from agreed that cashflow and runway are two of the key financial aspects they are concerned about, both with their portfolio companies and new opportunities. Another concern which was flagged was managing expectations of clinical trials and the backlog of the FDA approval process. The investors said startups will need to adjust their milestones in a tranced timeline and set up contingency plans. Rebecca agreed with these statements saying the typical funding horizon they look at is normally 12-18 months, however, they are preferencing

businesses to structure themselves so they have 18-24+ months of runway; mainly due to the uncertainty of the future funding market. Rebecca says businesses who have enough capital with contingency built in to get to their next inflection point are more attractive now than they were before COVID-19.

Rob Readnour, Managing Director of Mountain Group Capital Partners, said startups and investors are reevaluating their risk profile to make sure they are capitalized enough to get through this risky period. Two ways of the most secure ways of restructuring the finances are going to the investor syndicate and rerouting funds or preserving cash and cutting expenses.

Start Up Etiquette

When asked about what startups should be doing differently during this time to become an attractive investment candidate, Lydia listed several areas where startups must be prepared. Since investors are seeing so many opportunities, they are needing to move forward in a timely manner, meaning the due diligence process is tightening. Areas of preparation include:

- Having a secure and prepopulated data room
 - ProForma statement, business plan, patents, IP, legal documents, partnerships, etc.
- Use of technology for pitching and back up slides for questions
 - Become familiar with the platform used for pitching and be prepared for questions
- Be a friendly, confident, and responsive entrepreneur
 - The #1 detriment to start ups is a lapse in communication with potential investors



The entrepreneurs must be able to articulate the problem clearly and non-technically. Must describe multiple ways with general slides and back up detailed slides

- Do not force a COVID-19 angle on the company if it is not something that can be delivered
 - Though it may be timely, if it is not part of the core business it is a distraction
- Solid long-term vision with tangible milestones
 - Need to have resiliency strategy in a best case and worst-case scenario
- Know the terms of your raise and be flexible
 - Not all investors will have the same term requirements and will want reassurances

THE INVESTOR PERSPECTIVE ON COVID-19

Meat Processing

Tony Simpson, who is more heavily involved in the livestock industry, wanted to highlight the importance of safety and food security which will be in a higher demand after COVID-19. Consumers will demand that their meat be safe from the inside out, traversing the whole meat production supply chain. This reaches across from pathogens being on the outside of packaging all the way to the delivery person bringing the food inside for inventory. Consumers will want reassurances that the food which they put in their bodies and bring into their homes will be safe for them and their families.

Tony projected that the new face of the food processing and safety industry will be ripe for innovations such as:



Detection, monitoring, and tracking of animals and people coming into and leaving different environments

- “Treatment” of meat and packaging with technologies such as radiation, chemical, or UV light
- Certifications and validations that the food, as well as the packaging, was tested and passed inspection for pathogens
- Integration of block chain or other tracing technology

Tony claimed the key lessons learned from the meat processing side of the industry during COVID-19 was the preparation, production, and use of personal protective equipment (PPE). This is especially true for the United States for on-line processing workers, where 23 states have reported COVID-19 outbreaks in their meat and processing plants. Overall, there have been 16,233 cases of COVID-19 in 239 facilities with 87% of infections occurring in racial or ethnic minorities³³. Tony highlighted that a longer-term change we will see on the meat processing side of things are changes in industrial designs of processing plants. Creating greater physical separation along with more stringent biosecurity measures will be of the utmost importance moving forward to not allow this type of disruption in the food supply chain to happen again.

Tony stressed that the whole food supply chain will have to get on board with these measurements and fund or co-develop these innovations. This is imperative to the whole industry because consumers will make other food choices if it is proven that a staple product, such as meat, can transmit a virus or other pathogen.

Food Delivery Service Model

Not surprisingly, food delivery service was a burgeoning opportunity before the COVID-19 pandemic where some geographies are seeing a nearly 80% increase in demand of food delivery, which will most likely not go away even if there is a vaccine³⁴. Tony emphasized that this was not a fad since food delivery services met several needs:



Saves time for customers

- Convenience of not leaving home
- Efficiencies met such as multiple deliveries in one run
 - Increased revenues and decreased costs of logistics

³³<https://www.cdc.gov/mmwr/volumes/69/wr/mm6927e2.htm>

³⁴<https://useinsider.com/strategies-for-online-food-and-delivery-business/>

THE INVESTOR PERSPECTIVE ON COVID-19

- Environmentally friendly
 - Bicycle delivery services are prevalent in cities resulting in less cars on the road
- Safer and meets social distancing standards
 - People do not have to go into public and no gathering at restaurants
- Economic and revenue generator
 - Companies are still able to operate even under strict biosecurity measures

With the increase in food delivery services, the food supply chain can access its customers in different ways as traditional means such as restaurant or sporting stadiums are shutdown. Most companies have seen an uptick in repeat users for food delivery services and new users who may not have used food delivery services before³⁵. Tony said innovations which can follow

the food delivery service model, with the benefits listed above, will be the ones that rise to the top during and post COVID-19. Tony gave a personal example of his veterinary clinic which switched to offering convenience of vet care online. For years he had always gone into a small veterinary clinic to pick up his pet's medications until COVID-19 happened. Beforehand, he had no idea that his vet's office had an online portal where he could order his pet's medications and have them delivered straight to his house. Now, he says he will not be going back into the clinic to physically pick up his pet's medicine and has even started ordering a monthly subscription of his dog's flea and tick medication. If startups can embrace the "Food Delivery Model" and find efficiencies throughout the animal health value chain, they will be the ones who will get funded and be successful.

Shifting Interest in Innovations

Not surprisingly, most of the investors' areas of interest have shifted to virtual interactions and solutions for people and their pets to stay protected when reopening of economies happen. All of the investors highlighted that digital platforms which can not only offer herd management solutions but also identify, monitor, and track sick animals or "at risk" animals will be at the front of their mind when scouting for animal health startups. Along the same lines, technologies which can incorporate predictive analytics will also be more relevant now more than ever, not just from a zoonotic stand point but as a recovery and financial strategy for farmers who want to prevent losing money on a preventable problem. In addition, Robert Polzer highlighted that although they are laser-focused on precision livestock farming at Zoetis, COVID-19 has pushed them to look at innovations throughout the "continuum of care"; specifically, how it relates to vaccines. Robert said that Zoetis aims to link herd management software, biosensors, wearables, and POC diagnostics with vaccine approaches and therapeutic solutions.

Brian commented that they will be looking more towards technologies that are advancing the scientific field of animal health such as gene therapies and vaccines. In addition, they will be looking at startups with platform technologies and asking them how they could be using their solutions to address zoonotic diseases. As mentioned before, digital startups will be on their radar if the technologies are scalable and enable value creation for their customers.

Another area investors are interested in but still unsure about is the alternatives protein market. With shelves at grocery stores clearing out of toilet paper, bread, and meat, a surge in the purchase of protein alternatives was seen. In the US, plant-based meat saw sales grow up to 280% and oat milk sales rose 300%³⁶ as consumers were stocking up on non-perishable goods³⁷. This was not just seen in the US, as in Spain it was shown that during confinement, Spaniards adopted a more plant-based diet with an increased intake of fruit by 66% and vegetables by 59%.

³⁵ <https://www.statista.com/statistics/1105084/poland-growth-of-online-food-delivery-services-due-to-covid-19/>

³⁶ <https://www.foodandwine.com/news/oat-milk-stockpile-coronavirus>

³⁷ <https://www.greenqueen.com.hk/consumers-turn-to-vegan-meat-amid-coronavirus-with-sales-soaring-by-280-percent/>

THE INVESTOR PERSPECTIVE ON COVID-19

In the UK, 20% of Brits cut down on their meat consumption during the pandemic driven by the increased awareness of animal products on health and environment as well as lack of availability of normally consumed products³⁸.

Though this is an area of hesitation, it seems like more people had the time to try alternatives and may have been forced if their normal dietary requirements were not available.

Labor Shortages and Skills Gap

The US has been battling out an immigration policy for the last few years with changes making it extremely difficult for immigrant or international workers. With these workers removed, a large skills gap is created, and there is not enough people or integrated technology to fill that void. This is especially true in rural settings where farm environments are part of shrinking communities and are having troubles finding people to work and keeping the farms productive. Lydia gave a personal example of her brother in law in rural Kansas who each year relies on a small group of exchange college students for work around his farm. This program has been eliminated due to budget cuts to the Universities, and his 1,000-2,000-acre farm will be significantly impacted. She believes that technologies that address labor shortages on the farm or other digital farm management technologies will be on their radar going forward.

On July 6, 2020, the United States Immigration and Customs Enforcement (ICE) announced that international students in the US whose schools have moved to online classes during the Fall 2020 semester must leave the United States or may face immigration consequences. The Student and Exchange Visitor Program has introduced a temporary exemption to allow students whose courses have moved online for the summer semester to remain the United States, however, the exemption will not be extended to the next academic year. To date, 9% of US universities are planning to teach all their classes online for the Fall semester, although this could change.

When it comes to impact the figures are staggering. Last year, the United States government showed more than 373,000 M and F students visas were granted³⁹. According to the Institute of International Education, over 1 million international students were doing various graduate degrees in the US: making up roughly 5.5% of the total student community in the country. These students contribute to over \$45 billion to the United States economy. With this announcement, there is a large concern that a skills gap will form in the US's highest value creation positions as extremely educated individuals will no longer be allowed to study, contribute, or find jobs. These concerns are supported by the below statistics^{40,41}:

- Over 40% of American Nobel Prizes won in Chemistry, medicine, and physics since 2000 were awarded to immigrants



Nearly 62 world leaders have received higher education in the US (more than any other country)

- Over 23% of billion-dollar startup companies in the US were founded or co-founded by an international student
- International students support 455,000 US jobs
- Patent applications rise by over 11% with a 10% increase in the number of international graduate students

Not only does this challenge have a drastic impact on the United States as a whole, but the statistics suggest the most impacted studies will be those of the sciences, including human and animal health.

³⁸ <https://proveg.com/blog/how-covid-19-is-accelerating-developments-in-the-alternative-protein-sector/>

³⁹ <https://www.bbc.com/news/world-us-canada-53320336>

⁴⁰ <https://www.visualcapitalist.com/international-students-impact-u-s-economy/>

⁴¹ <https://theconversation.com/6-ways-a-drop-in-international-students-could-set-back-us-higher-education-138927>

THE INVESTOR PERSPECTIVE ON COVID-19

Sustainability

When asked about investor's appetite around "sustainability" Lydia said her group is more focused on ROI, however, she has seen good companies being built around sustainability such as cutting down on CO2 emissions, smarter land use technology for farming and for animal welfare. One company iiM has invested in that addresses sustainability is a bioplastics company which offers four varieties of bioplastics: starch composites, wood composites, biodegradables, and elastomers.

Interestingly, Robert Polzer noted that this is an area they will be focusing heavily on in the short term. Robert said solutions in this area need to have the customer in mind first, making sure they are meeting expectations from a governmental, regulatory, and societal perspective.

For example, Zoetis is keen to look at alternatives to antimicrobials which would utilize an animal's own immune system to promote wellness. In fact, this is one of the reasons Zoetis formed an incubator in conjunction with Colorado State University to focus on immunotherapies and alternatives to antibiotics. Michael echoed these thoughts saying that feed additives, anti-inflammatories, alternatives to antibiotics, and probiotics will be getting more attention now as it will be essential to build up human's and animal's immune system so that zoonotic disease or pandemics will not be so devastating.

Laetitia Gerbe, Partner for Investments at Seventure Partners, agreed and said now more than ever locally sourced food will be important for consumers and solutions to rebuild trust between consumers and farmers will be important.

Deal Flow

All the investors said deal flow has been stable with some claiming they have seen an increase in the startups cold calling. Most believe the increase is due to the industry not having the face-to-face interactions at conferences and other events, forcing startups to be more aggressive with contact and reaching out through other networking platforms. To date, the US government funding for the SBIR and STTI grants are still on path for the fiscal of 2020, which is where almost all University startups get an injection of non-dilutive cash at a critical time. In addition, there has been large amounts of money being redirected for the Paycheck Protection Program (PPP) and other small government loans to help keep startups afloat in the United States.

Rob Polzer from Zoetis specifically said they frequently look outside of the human health and animal health start up bubbles when scouting for new innovations. Complementary areas of interest are physics, mathematics, bioinformatics,

systems biology, modeling in simulation systems, and plant sciences. Rob said they have looked at simulation solutions to forgo wet lab activities, which can speed up development time and decrease cost. In addition, they have taken an interest in bioinformatics which can take big data and create insights from pattern recognition and data analysis.

Sarai Kemp, VP Business Development of Trendlines AgTech, said she has also seen a significant increase in potential strategic partners. Sarai said this has happened for two reasons:

- 1 FOOD SECURITY HAS BECOME AN ISSUE IN THE MEDIA GLOBALLY**
 - a. Pushing strategic partners to connect that were reluctant to go to external innovation
- 2 THE NEED FOR ALTERNATIVE PROTEIN**
 - a. Huge and growing segments with large IPOs and investments pushing larger players into this space where they were hesitant to go

THE INVESTOR PERSPECTIVE ON COVID-19

Joost Matthijssen, Director of Venturing at Nutreco, said his firm has invested in two cell-based meat companies one in the US and one in the Netherlands. Joost said COVID was a catalyst for alternative protein segment of the industry, however, he says there will always be an appetite

for traditional meat products which hold a strong economic support for the world. Joost said the impact to species has been varied as eating habits were forced to switch from out of home to in home, strongly impacting consumption of dairy, beef, and shrimp.

New Features in Start Ups

Most investors said that almost all the startups they are seeing now have COVID-19 somewhere in their deck. Whether it is a risk or an opportunity, companies have pivoted to address the pandemic. Rob Readnour said, specific to CROs, a lot of companies who had trials planned have pulled out, clearing the queue, and allowing startups to set up trials in weeks versus months. This has expedited some timelines and could be a unique positive from COVID-19 for startups.

In addition, Rob said startups are realizing that investors are looking for later stage, less risky assets, so they are pivoting to link to a revenue story that is relatively quick. This means startups which may take a long time to mature, will be more at a disadvantage than normal in this investing ecosystem and to make more realistic milestones with less resources will be more palatable and attractive to investors.

Key Insights

Tony emphasized how resilient small businesses and entrepreneurs can be and how fast they have been able to adapt to a new reality. This includes considering new realities for funding either creating a backup cash capacity, reevaluating the value of a company, or adjusting raise amounts for more tangible milestones. Lydia also echoed Tony's sentiment in how impressed she has been in entrepreneurs to shift and adapt in uncertain times. She also said that if COVID-19 teaches startups anything it would be to have a contingency plan and expect the unexpected. Staying disciplined financially and having investors on board who are truly committed to the company's best interest are what will differentiate the successful startups from the rest.

All the investors agreed that they would prefer face to face interactions with the companies that they are evaluating for investments. Due to the lockdown restrictions, travel has become harder and entrepreneurs are having to pitch over digital platforms and field questions.

Though it has been more difficult to form relationships and get an in person feeling for the technology and team, all the investors have agreed that online meetings have become second nature and parts of the "old way of pitching" process may move to being virtual from here on out. Cindy Cole, Partner at Digitalis Ventures, said that *"without a personal connection we are less convinced and more focused on the analytical part of the process by asking for more data. It's hard to feel like comfort level if you haven't had that face to face meeting so to make up for that, we are digging deeper and looking for more information."*

Impacts on Startups

It could be argued that out of all the stages of businesses which have undergone the lockdown restrictions startups have been hit the hardest.

Startups have the pressure of not just pushing the business forward during this uncertain time, but they also have milestones and money at risk if they are not able to achieve important checkpoints. Unlike the bigger animal health companies, startups rarely have a cushion of cash to fall back when things get tight.

In addition, startups have investors, which are critical for later-stage follow on investments, to answer to if forward momentum is not successful. Four animal health startup companies gave insight into how they have been handling fund raising, milestone development, and employee wellbeing over the past four months.

Startup Challenges and Pivot Points

Joy Parr Drach is CEO of Advanced Animal Diagnostics and shared that they were able to take their white blood cell differential test for cattle and repurpose the test to help detect COVID-19 infection in humans. She added that COVID-19 presented their company with a chance to not pivot away from what they were doing but to pivot to a new opportunity. Joy claims her company has developed the fastest white blood cell differential test for animals and humans and can deliver results in one and half minutes. She highlighted that her company's core competencies were focused on ensuring a safe and abundant supply of animal protein, including the food supply system which was severely affected in the United States.



IMPACTS ON STARTUPS

Their newly developed human POC diagnostic is simple enough anyone can use it and is currently going through a FDA 510 K process with pre-submission. Once this test is approved, it should be ready to deploy for rapid on-site detection in the meat packaging and processing plants. Joy said that this was a unique opportunity for Advanced Animal Diagnostics to expand their offerings, aid in stabilizing the food supply chain, and look out for human and animal welfare.

Chris Belnap is CEO of Resilient Biotics which is a respiratory health company that identifies important microbiome strains to improve lung health. Their current focus is on identifying microbes for the treatment of Bovine Respiratory Disease and looking at how these strains could be used in other species. His work is extremely timely as the Coronavirus in humans presents symptoms which are respiratory focused such as chest pains, difficulty breathing, shortness of breath, and most notably a dry cough. One of the biggest challenges Chris said his start up has faced during the lockdown measures has been the shutdown of their laboratory in North Carolina. He was forced to stop the key studies they were conducting and has not been able to generate new data. With the extra time, Chris said his team started to examine if there is crossover in the microbiome populations for possible applications in human health. Since the company's therapeutics are geared towards the severe part of the respiratory infections (i.e. bacteria) they are taking a closer look at their data and focusing on the viral component to see what impacts they could have in a viral respiratory infection, like the Coronavirus. Overall, he says his start up is about 1 month behind in their trial design and they are just now trying to get back in the laboratory.

Tom Weaver is CEO of PetMedix which is focused on monoclonal antibodies for pet-based therapeutics. Against all odds, his team and company have been extremely active and have been able to continue operations through the pandemic. They have also been able to raise VC financing and bring in a third investor all while moving laboratories and doubling their capacity. He claims they have introduced a new technology platform and they are on track to getting their first drug candidate into a dog at the end of the year.

Tom said one of the key differences he saw from biotech operations in the US and the EU was the ability to rally together and lobby government. Tom is part of the UK BioIndustry Association (BIA) which is a lobby group for SMEs who able to present a case to the government that they should stay operational to continue developing solutions against the Coronavirus. The BIA made huge contributions in diagnostics and serological testing and Tom and his team were given the go ahead to continue operating. Tom said those who could work at home did but the laboratory stayed fully operational; a feat most startups were unable to match. In addition to staying operational, Tom said there was one positive to come from the COVID-19 pandemic for his startup. Normally they are reliant on a third-party service provider to help in their studies and with the lockdown they ceased operations. This forced PetMedix to go to their investors and ask to redirect funds to purchasing and bring in new technology and equipment. With the investor's approval, PetMedix acquired the new equipment and they are now no longer dependent on third parties; giving them an advantage to remain operational when others were stagnant.

Anton Xavier, CEO of K9 Biotech, recently came out of stealth mode at the beginning of 2020 and was in the process of trying to raise a Series A round when the pandemic hit. His company is focused on an oncolytic virus for use in humans and animals. Interestingly, he said his strategy was much different than the other startups as it is key for them to stay on lead strategy in oncology and inflammatory, having no plans to deviate to obtain a COVID-19 angle. Anton says coupling a high unmet medical need with a large enough patient market is one of the most important aspects of a startup's solution. He says his company is not looking to pivot to address the COVID-19 pandemic because it is out of their scope. Anton also highlighted they have had trouble trying to raise their Series A during this time as investors are more risk adverse and are focused on their portfolio companies.

IMPACTS ON STARTUPS

Planning is Key

All the startups agreed that one of the most important factors which has allowed them to remain functional is because of their contingency planning. Joy said one of the factors that kept her team going was giving reassurance and have clear policies and standard operating procedures in place. This rang especially true since their team was out sampling meat processing workers who may or may not be infected with the Coronavirus. Joy said giving her team information about next steps if someone were to become ill and who would be picking up their work managed expectations and let the team know they would be looked after no matter what.

Joy stated, *“It is important to build the ark before you need it”* and that this type of planning is critical for startups who do not have big HR departments to handle these situations.

Tom echoed Joy’s remarks by quoting US President Dwight D. Eisenhower, *“Plans are worthless, but planning is everything”*. Tom said early on he identified the business-critical pathway and focused on key elements and experiments that met value inflection points for the company which kept them on target and on time during lockdown conditions.

COVID-19 Related Funds and Loans in US and UK

Due to the cash strapped challenges startups naturally faced, governments from all over the world set up funding opportunities for businesses to take advantage of. Joy said their company wanted to file for the Paycheck Protection Program (PPP) which is a small business loan that helps business keep their workforce during the COVID-19 crisis in the United States. This was not an easy process as Joy quickly found their bank was not set up as a small business association lender. Joy highlighted this is why having strong investors backing your company is so important, as she was able to reach out to her investors which set her up with another bank which was an accredited lender. The company was able to file the first day, however, they were not selected from the first round. They filed again and were successful in obtaining that funding which Joy says has made their runway longer. In addition, she said a push for diagnostics in the United States during this time has given them tailwind in approaching investors and having investors approach them.

Tom said from the UK perspective there have been several funds open for businesses to take advantage of. A similar initiative to the US’ PPP is the UK’s COVID Business Interruption Loan (CBIL) which required an EBITDA; unfortunately, ruling

out a lot of the startups. To address this gap, the UK government put out another funding scheme called the Coronavirus Job Retention Scheme or the Furlough Scheme which allows UK companies to furlough employees where the government will pay up to 80% of people’s working wages to a maximum of £2,500 per month⁴². As of June 28th, nearly 9.3 million people in the UK have been furloughed and £25.5 billion in wage subsidies has been paid to employers. PetMedix did not utilize this scheme but did take advantage of the deferment of taxes a company has to pay on salaries called Pay As You Earn (PAYE) which gives startups more flexibility with cashflow. Another loan scheme PetMedix is considering is borrowing against their R and D tax credits. In the UK, the government will give a grant back to the company of up to 33% of what it has invested for research and development activities. With the pressures of COVID-19, the government and other lending agencies will allow companies to borrow against this grant. Another cash source is the Future Fund, which is a £750 million venture fund that the government has established. Though the initiative is well reasoned, Tom mentioned it was nearly 10x oversubscribed with onerous 2x payback stipulations for a 3-year loan or a significant discount of any raises within the next 3 years.

⁴²<https://www.wired.co.uk/article/uk-furlough-scheme-job-protection>

Response and Impact to the Large Animal Health Companies

With commentary from:

Kathy Turner
*Corporate Vice President and
Global Chief Marketing Officer*
IDEXX

Glenn David
*Executive Vice President and
Chief Financial Officer*
Zoetis

Aaron Schacht
Executive Vice President
Elanco

Sebastien Huron
CEO
Virbac

The large animal health companies and their leaders highlighted several areas of opportunity and concern regarding how COVID-19 has affected their corporate strategy and operations. One thing that became glaringly apparent was the regionality and geographic differences that COVID-19 had impacted on animal health businesses. While some areas of the world were undergoing the later stages of the COVID-19 outbreak, other areas were just entering. Several evolutions were happening within the industry that were categorized into short- and longer-term changes. Collating responses from industry giants like Elanco, IDEXX, Zoetis, and Virbac, several key trends were found to be consistent across the world as a response to COVID-19.

RESPONSE AND IMPACT TO THE LARGE ANIMAL HEALTH COMPANIES

Short term changes:

- Increase in demand for cheaper protein options with shorter life cycle species
 - Poultry, eggs, and tilapia
- Decrease in more expensive protein options
 - Hamburgers, steak, and salmon
 - Fiscal response as well as secondary effect of restaurants closing and sporting events closing
- Back to the basics
 - Seeing less emphasis on wellness more on emergency care
 - Secondary response pet owners are paying more attention to their animal's health as a function of home lockdowns

Longer term changes:

- Changes in company culture and environment
 - Remote and home working government mandated, and employee requested for longer term
- More automatization in manufacturing
 - Less social interaction and disruption in supply chain
- Market revolution in digitalization
 - Increase in online retail and home delivery, more consolidation, and more trust in what is local
- Strengthening of the human-animal bond
 - More interaction, emotional support, and dependence, as well as growth in adoptions for companion animals

Impacts on Business Operations

One of the marked successes of the industry, which spanned globally, was the recognition of the animal health industry as being an essential business to continue operating during lockdown situations. This was in part due to the relaxation of previously strict regulations on aspects like telehealth consultations with veterinarians as well as governmental lobbying groups advocating for segments such as reference labs to continue operating. Aaron Schacht, Executive Vice President of Elanco, said they made the decision to maintain all operations and essential R and D activities to keep the supply chain full while making sure their employees were safe implementing

new biosecurity measures and creating flexible working programs. Kathy Turner, Corporate Vice President and Global Chief Marketing Officer of IDEXX, revealed as soon as the news about the Coronavirus started to grow within China, they immediately went to work increasing inventory. With nearly 80 laboratories around the world, their main concern was ensuring critical testing and delivering timely results. Similarly, Glenn David, Executive Vice President and Chief Financial Officer of Zoetis, stated they have continued operations ensuring their manufacturing sites remained opened and mandating employees eliminate non-essential business travel as well as working from home since early March.

Integration of Technology

The industry has had different responses to integration of technology in their day to day working operations as well as interactions with their customers. Elanco immediately prioritized the need to get in front of their customer and continue keeping relationships warm.

They managed to continue relations through detailed information and technical consulting along with adopting new ways of working, such as their partnership with VetNow, which was a direct and immediate response to the COVID-19 pandemic.

RESPONSE AND IMPACT TO THE LARGE ANIMAL HEALTH COMPANIES

IDEXX shifted their business model to offering more education through webinars as well as installing instruments in clinic remotely using video and other tools. This was a key learning for IDEXX, as they found not only were they able to successfully implement technology without a technician physically travelling to a location, but they were able to serve remote areas where before they would not have had such easy access; something, they noted, which will now be part of their service offerings even on the other side of COVID-19. Sebastien Huron, CEO of Virbac, said they saw their veterinarians were refusing to meet for up to 2 weeks as they were trying to play catch up with vaccinations. Consequently, Virbac bent its business model to match their veterinarian's needs by facilitating e-visits early in the morning or later a night; something they too aim to continue forwards. They also saw that their marketing seminars, which was switched to a virtual platform, garnered better attendance than ever before and reached more people as they were now speaking to whole teams rather than just to the leaders; saving time and spreading awareness. Zoetis saw the acceleration of precision livestock farming projected into the spotlight and offering solutions to an industry where labor has become a challenge. All the industry leaders agreed that production of veterinary medicine in reference to manufacturing and supplies had not been impacted due to the disruptions in the supply channels in China.

In terms of telemedicine, Kathy Turner from IDEXX quoted CM Research which stated at least 50% of veterinarians are now using telehealth

for remote consulting, emailing, and sending information to patients with another 25% of veterinarians currently looking into platforms moving forward. Although not all aspects of veterinary care can be done remotely, such as drawing of blood, having consultations to understand if a pet should be coming into a clinic can help deepen the understanding of diagnostics. This is especially true because only 20% of cats owned the United States are coming into the veterinary clinic for routine veterinary care; remote consultation looks to address that underserved segment

All the large animal health companies still felt "bullish" or optimistic about business operations and opportunities even in these unsettling times. For the veterinary industry, it seems like the "V" shaped recovery may happening quicker than expected as clinical visits to a veterinary practice in early April had declined 25-30% in year-over-year visits, however, by May 22 this growth rate had stabilized and was flat; indicating growth. Zoetis was able to launch their 3-combination product, Simparica Trio, in cycle and shift sales to online channels. With visits returning to "normal" they have noted an interesting insight that revenues per visit have increased as well. With pet ownerships increasing in the upcoming generations, the companies agreed it was importance to offer better products, more diverse strategies for access (i.e. e-commerce or digital offerings) and meet demand for human-quality pet health care. Another key insight to come from pet owners is during the period of lockdown is dog walking is up 25%.

Innovation in Livestock and Companion Animals

Despite challenges in the US, where meat packing and processing plants were at 70% capacity, the animal protein demand has stayed relatively consistent with the main differences being felt in channels and segments. This was identified as a key area ripe for immediate solutions as it was noted that the livestock side of the market has had less innovation when compared to companion animals. The discrepancy in innovation lies with species growth cycles which tend to mirror innovation cycles.

The ability to innovate in the smaller species on a per unit cost is lower so proving out technologies in companion animals tends to be more abundant.

Another huge innovation opportunity identified by the large animal health companies' is the absolute need to reform and renew the older technology platforms such as vaccines constructs.

RESPONSE AND IMPACT TO THE LARGE ANIMAL HEALTH COMPANIES

Aaron revealed this is an area that is Elanco is interested in particularly related to RNA and DNA vaccines. A prime example is Moderna (a medium sized mRNA technology platform company) who created a fast reduction to practice of an antigen for COVID that can be delivered in a mRNA form. Through this the development, Moderna was able to show a de-risking of this platform while proving it in a technical dimension at scale and in rapid focus and attention. Though this is a human health example, this should encourage the large animal health companies who were reluctant to move into this space, a more attractive opportunity. Most of the companies who were on the call were intrigued in this area and are awaiting the right time to pursue new entrants in this category. It was made apparent that mRNA vaccines specifically will be a feature of the future for the animal health industry. Aaron did note, from a regulatory standpoint there will be hurdles, as the terms and association of the mRNA vaccine and “genetically modified” (GM) will be a barrier, however, they can be overcome. Aaron gave the example of Elanco’s DNA vaccine for pancreatic disease in salmon, Clynav, which is the only DNA vaccine that has been approved in Europe. Elanco spent large amounts of time and money proving that the salmon was not genetically modified after injected with the DNA vaccine; going to show the opportunities are achievable.

The renewal of old technology platforms in reference to vaccines rings especially true in livestock, where the swine industry still reeling from the impacts of African Swine Fever (ASF). As a result of this destructive virus, the swine

industry has been reshaped with a consolidation of the swine market and implementation of biosecurity measure and higher standards of production. Relevantly, this has improved the production regulations in China with less backyard farming and more standardized production. With the outbreak of the COVID-19 pandemic speculated to have originated in a wet market in China, the companies agreed the industry should see further consolidation and rapid changes in the food production industry in China in lieu of a vaccine. Sebastian from Virbac also commented that perhaps one positive from the COVID-19 pandemic is the renewed interest and awareness of vaccines and vaccine perception. He suggested that with this area showcased with the aid of grants and scientific breakthrough, perhaps years’ worth of headway can be made in months. From a companion animal side, there is hope to that the nearly 30-40% of pet owner who do not take their animals to the veterinary may have an interest in vaccination and pet care due to the conversations around COVID-19.

Robert from Zoetis said the monoclonal antibodies that Zoetis has been working on for osteoarthritis for cats and dogs were still on target for launch in the upcoming months and are under regulatory review in the United States and Europe. Robert also said we should expect to see advancements in their portfolio vectored vaccines in the near term and that COVID-19 has forced them to prioritize these products over some of the other longer term projects they have in their pipeline.

Lessons Learned from COVID-19

Sebastian Huron from Virbac highlighted that globally the scientific community has not collaborated well enough on the sharing of information, personal protections equipment (PPE) or messages during the pandemic. Numerous experts interviewed spotted the impact this pandemic has had on countries’ response to supply chain dependencies, withdrawing from trade with other countries and placing more of a focus on protectionism.

From an economic standpoint, COVID-19 has reversed the trend of globalism and will have lasting effects on all aspects of manufacturing and distribution both in the animal health industry and in other market sectors. Overall, the collective intelligence was not handled as well as it should be, and countries were not able to learn from their neighbors exacerbating the spread and damage of Coronavirus.

RESPONSE AND IMPACT TO THE LARGE ANIMAL HEALTH COMPANIES

Aaron Schact from Elanco echoed these sentiments with one of the big takeaways for him being how we communicate technically challenging information to a mass population. Organizations whose sole purpose is to facilitate such dissemination struggled to get this right and as a result policy lagged in its ability to respond effectively.

In some instances, the pandemic was also politicized from various angles leading to manipulation of information flow which also added to the delay in timely response plans. All the leaders agreed that messages pertaining to COVID-19 that are pushed to the community should be scientifically backed, clear, concise, and socially palatable regardless of any socioeconomic status.

E-Commerce

When looking at e-commerce as it relates to the big animal health companies, Kathy Turner noted most of them are already present with IDEXX, for example, having a significant portion of their products ordered online. Sebastian agreed that Virbac has seen e-commerce being a long time trend that was mainly focused on the business to business to customer pathway, however, in light of COVID-19, the customer has taken a more powerful role that will most likely not be given

Another key insight which was highlighted by Aaron Schact was the fundamental changes the Universities will have to endure in the coming months. Universities are highly dependent on in person learning which is where many claim the unique value of Universities lie in collaboration in groups. Academic institutions are going to have to evolve where future leaders get their learning, which is going to be especially trying for those who will have to have hands-on practicum such as veterinary students practicing surgeries. Universities must become agile enough to offer different modes of educations and rebuild programs to deliver education while also ensuring student and teacher safety. Already innovations in this space have emerged where veterinarians and pet owners have set up online trainings to fill some of the void.

back. Glenn David from Zoetis agreed on the wave of e-commerce referencing Chewy.com as one of the most impressive examples. However, he emphasized that there is still a large portion of sales that happen in clinic where 50-60% of Zoetis' product portfolio is administered. Aaron from Elanco said it was a conversation of "and" rather than "or" and that innovation opportunities lie in making product use more compliant.

Pandemic Preparations with POC Diagnostics

With IDEXX being the leading diagnostic animal health company, point of care diagnostics is very much on their radar. Though a large proportion of their revenues are made through reference laboratory services and testing instruments in veterinary clinics, Kathy claimed they are keen to look into POC diagnostics along as it meets two requirements:

- 1 IT COMPLIMENTS WHAT IS BEING DONE WITH THE VETERINARIAN AND
- 2 MUST BE ABLE TO BE INTEGRATED INTO THE PRACTICE MANAGEMENT SOFTWARE.

The real value proposition for this technology will not be in replacing the testing done with the vet, but will be in a number of areas with chronic diseases that could improve medication compliance and monitoring the progression of the pet's health or disease state. Currently, there exists a point of care diagnostic for diabetes in dogs and IDEXX offers a point of care diagnostic for pregnancy of cattle. This type of on-farm diagnostic test is an area that Kathy highlighted IDEXX has extreme interest in. Glenn from Zoetis agreed with Kathy's remarks that having a point of care test which could give quick and accurate results could protect animal welfare and result in huge preventative cost savings to farmers.

RESPONSE AND IMPACT TO THE LARGE ANIMAL HEALTH COMPANIES

A lot of farmers send samples to college laboratories for testing which can take anywhere from 24 to 72 hours to get results; this time gap is too long to make any type of preventative decisions. Aaron echoed the other leaders' comments claiming the "perfect" solution will happen when miniaturization, automation, and

digitization come together in an accurate and repeatable POC diagnostic. Robert Polzer from Zoetis, said they are very keen on point of care diagnostics especially if it can marry with their precision livestock farming business segment with the aim to deliver results to farmers, pet owners, and veterinarians more rapidly.

Top Priorities in the Next 6-12 Months

Sebastian stated that Virbac's top priorities are:

- 1 **The health and safety of employees**
 - a. Equip them for success to work remotely
- 2 **Supply of customer**
 - a. Have suffered some from this and reshaped business around supply bottleneck
- 3 **Support the community**
 - a. Donated PPP to local hospitals and other support
- 4 **Protect margin, increase supply and safety stock**
 - a. Looking to add to top line and cash correction as currency has been devalued
- 5 **Prepare for the second wave**
 - a. Have contingency plans for business and employees
- 6 **Enforce "One Team" and sense of belonging**
 - a. Employees have been fast and reactive and have organized "digital coffees"

Kathy stated that IDEXX's top priorities are:

- 1 **Safety and health of colleagues**
 - a. Support for remote working
- 2 **Listening to customers**
 - a. Focus on delivering products and results
 - b. Develop medically relevant diagnostic protocols and products building a durable revenue stream

3 **Continue with R and D and commercial investment**

- a. Launched 2 new products during pandemic
 - i. IDEXX SARS-COV-2 (COVID-19) RealPCR Test for pets
- b. Continue with R and D plans as projected

Glenn stated that Zoetis' top priorities are:

- 1 **Safety and health of colleagues**
 - a. Equip for working at home
- 2 **Supporting customers with consistent supply**
- 3 **Bringing innovation to the market**
 - a. Investing in innovation that fall within the Zoetis "Continuum of Care"
 - b. Further support the launch of Simparica Trio
 - c. Brining new monoclonal antibodies to pain

Aaron stated Elanco's top priorities are:

- 1 **Listen to families, customers, employees, and society**
 - a. Understand the issues we can influence directly and coordinated focus
- 2 **Closing of Bayer Animal Health Acquisition**
 - a. August 3rd Bayer Animal Health separates from Bayer AG
 - b. Start integration journey and incorporating employees together

Large Animal Health Companies' COVID-19 Responses

BAYER ANIMAL HEALTH

Bayer has donated protective gear and allowed employees with medical backgrounds to take a leave of absence to support the local health systems.

BOEHRINGER INGELHEIM

BI has helped the China Red Cross Foundation provide protective equipment to hospitals and has supported employees through donation matching to COVID-19 causes in the United States.

The company also donates disinfectants to authorities and social institutions in Germany. In March 2020, BI launched PetPro Connect across the United States to provide an easy and safe way for pet owners to connect with their pet care professionals during the COVID-19 pandemic.

CEVA SANTE ANIMALE

Ceva has donated PPE to hospitals surrounding manufacturing plants while also producing and sharing hand-sanitizing gels.

ELANCO ANIMAL HEALTH

Elanco has donated over \$70,000 to foodbanks and programs to feed school children in areas of the European Union, United Kingdom, and the United States facing food insecurity. Specifically, in the United States Elanco is leading a coalition to raise \$1.6 million to feed 10,000 families with children in the Indianapolis Public School system. The company has also donated supplies to local hospitals and first responders. In addition, they partnered with VetNow to offer telemedicine solutions for their veterinarian clientele.

IDEXX

IDEXX has donated over 30,000 mases along with gloves, safety glasses, and hand sanitizers to Chinese health authorities early in the pandemic.

MERCK

Merck Animal Health has donated PPE and other supplies, enabling employees with health care backgrounds to take leave and support the COVID-19 response. They have also done an internal assessment to see if they have available antiviral candidates and vaccine assets that could potentially impact COVID-19.

PHIBRO ANIMAL HEALTH

Phibro has donated to support healthcare workers access to protective equipment, childcare and food support for lower-income families and its facilities are now producing sanitizers for hospitals and first responders.

VETOQUINOL

Vetoquinol has donated over 6,000 face masks to hospitals and associations in their surrounding regions.

VIRBAC

Virbac has started working with the French National Agency for Veterinary Medicinal Products to supply anti-inflammatory and anesthetic products to hospitals and donating masks to local medical facilities.

ZENOAQ

Zenoaq has donated face masks and focused on its safety committee on the protection of customers, employees, and community against COVID-19.

ZOETIS

Zoetis has donated hand sanitizer, masks, and gloves to customers to help them continue to provide essential services while in Italy the company has organized a financial donation to the Red Cross to support relief efforts. The company has also pledged to donate money to the COVID-19 Response Fund with Feeding America which helps food banks across the nation. Zoetis also was able to rapidly identify and deploy protocols for PCR testing that allow for confirmation of a SARS-COV-2 infection in animal species.

Impacts of CRO's, Animal Health Associations, Government Agencies, and Large Corporates

With commentary from:

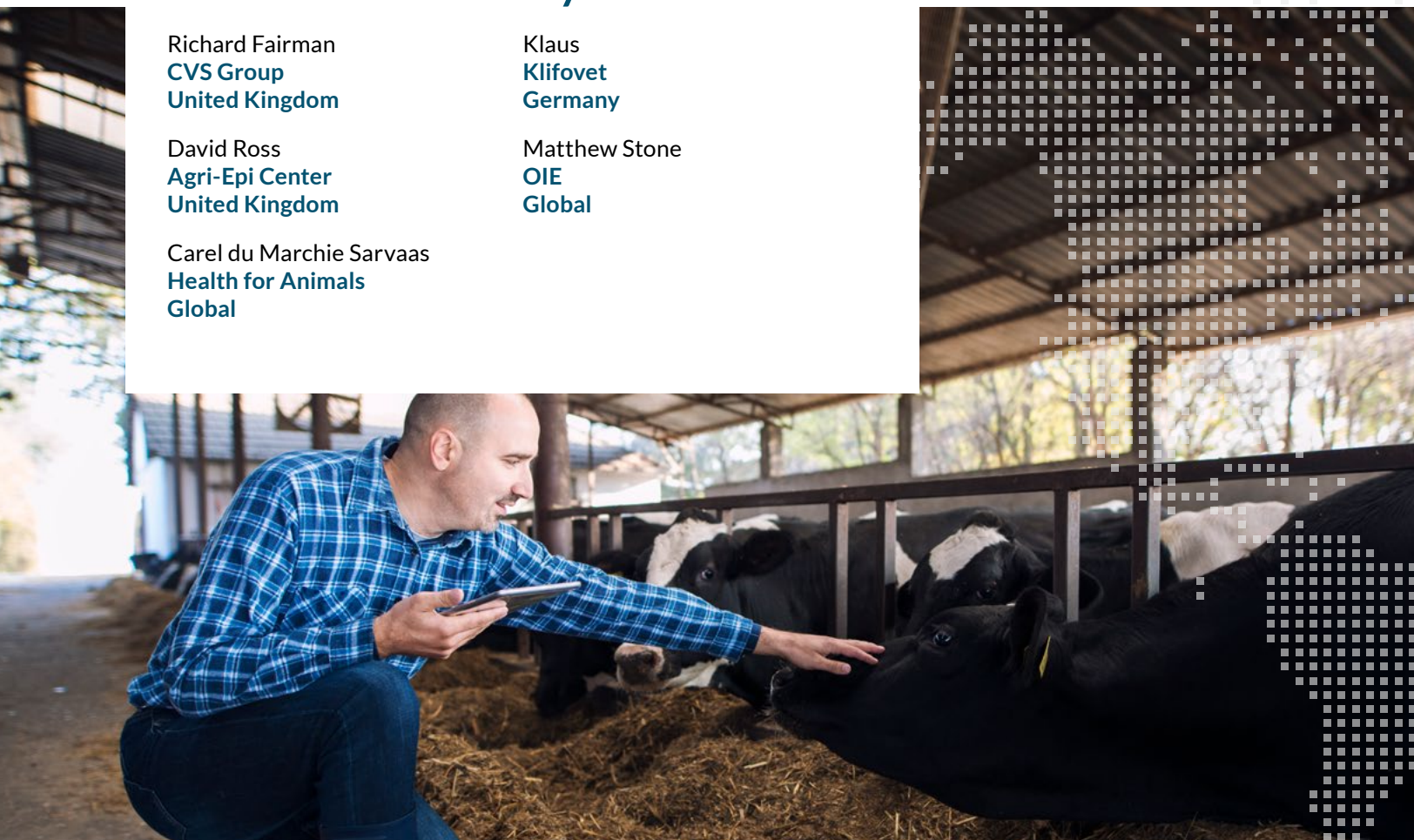
Richard Fairman
CVS Group
United Kingdom

Klaus
Klifovet
Germany

David Ross
Agri-Epi Center
United Kingdom

Matthew Stone
OIE
Global

Carel du Marchie Sarvaas
Health for Animals
Global



IMPACTS OF CRO'S, ANIMAL HEALTH ASSOCIATIONS, GOVERNMENT AGENCIES, AND LARGE CORPORATES

Responses from Large Organizations

HealthforAnimals is a global industry association which represents 28 regional and national associates focused on pharmaceuticals, vaccines, and diagnostics. Some of the corporate members are Bayer, Boehringer Ingelheim, Ceva, Elanco, IDEXX, Merck/MSD, Phibro, Vetoquinol, Virbac, Zenoaq, and Zoetis. As a global organization, they have prioritized the animal health industry's needs and concerns during this pandemic, creating guidance and literature for governmental and corporate bodies.

In response to COVID-19, the association has focused on giving support to limit the spread of the outbreak by offering guidance such as expanding tele-network, staggered work schedules, temperature checks, sanitizing stations, social distancing, biosecurity for outside service providers, and new protection regulations for visits to customers. Several of the big animal health companies have allowed employees with medical backgrounds to take leave and join the fight against the pandemic. Other companies have produced and donated large quantities of sanitizers and PPE such as masks. Other corporations have supported foodbanks and aided in fighting food insecurity in local communities. Some of the large corporates made financial donations to the Red Cross while almost of all the corporate members assessed their internal portfolio for treatments.

The organization has reached out to pet owners and veterinarians to make sure they had the support that they needed as well as working with large corporates and associations to lobby for medical veterinary products to earn the status of "essential" in all markets. This allowed companies to continue production and continue movement of products across borders to increase stockpiles and strengthened the supply chains. As a result, HealthforAnimals reports there have been no veterinary medicine shortages reported in any major markets.

The short-term response for COVID-19 that HealthforAnimals has deployed it to continue to support customers as they adapt to new consumer demands and socially distanced operations from the veterinary standpoint. The long-term response will be to focus on new animal health tools which can improve animal health in terms of telehealth solutions and diagnostics. Looking forward, Carel has already started to see strong sales recovery as M&A activity has continued, new channels are being brought to customers, the demand in protein has stayed consistent, and the demand for companion animal products has increased. Carel highlighted that one positive outcome from COVID-19, has been the heightened awareness of disease spread and underlined the importance of animal health including the importance of the human-animal bond.

The OIE, which is the World Organization for Animal Health, is mainly set up to serve the government veterinary authorities. Matthew Stone, the Deputy Director-General for the OIE, said the first action they took in response to the outbreak is to establish an Incident Management System, which was an R & D blueprint to treating COVID-19. This included identifying research priorities, communicating results of on-going research in animals, establishing scientific opinions on the implications of COVID-19 for the animal health industry, implications in animal trade and products, and providing guidance for Veterinary Services⁴³.

The OIE also worked with the World Veterinary Association to promote veterinary services as an essential service necessary to support the global food supply. With increased awareness of possible infection in companion animals, Matthew said the group produced guidelines for laboratories who were being drawn into national diagnostic testing for animal health. In addition, the group has been very active in encouraging the surveillance of animals from a One Health perspective.

⁴³https://oiebulletin.com/wp-content/uploads/2020/05/OIE-News-May2020-Special-Edition-COVID-19-main-news-article_withoutstatement.pdf

IMPACTS OF CRO'S, ANIMAL HEALTH ASSOCIATIONS, GOVERNMENT AGENCIES, AND LARGE CORPORATES

The role of the OIE at this time has been issuing guidance but also being a connector by forming ad-hoc groups of experts that can give opinions and collaborate on handling the outbreak. For example, one of the most active and pivotal working groups formed has been the OIE Wildlife Working Group which has issued statements about reducing “spill over” events (i.e. SARS and

Ebola virus) while also promoting welfare and biodiversity. The second strategic direction the OIE will take is answering the call of building greater resilience within the industry from contingency planning to business continuity planning and finally mounting a global government response with a One Health interdisciplinary mind frame.

Labor Shortages and Skills gap from COVID and Brexit

Some interesting insights that have come from the pandemic have been the emphasis on companies reflecting on their carbon foot and putting and spotlight on their employees and families. The Agri-Epi center is more focused on crops and livestock sectors with an interest in sensors, diagnostics, precision livestock farming, and application of technology to improve performance and reduce variability. David Ross, CEO of Agri-EPI Center, said he saw an immediate response and focus on the crop sector and livestock sector which saw a direct consequence of the lock down as the reduction in labor due to migrant workers. This issue was already under jeopardy due to the Brexit changes in policy and has only been exacerbated by the travel restrictions due to COVID-19. David said the timing of the pandemic mirrored the timing of the UK growing season, which saw a flood of migrant workers leaving work to make it back to their home countries while they could.

This has created a huge issue in the UK where high quality animal husbandry work has normally been sourced from the Eastern European countries. It is estimated that over 80,000 agricultural workers are need annually in the UK, however, with the COVID-19 restrictions only 30% of the migrant workers are expected to make it over⁴⁴. Although this could cause another shock to the food supply chain, David highlighted this gives the UK a

great opportunity to collaborate and accelerate the development and uptake of robotics and automation in the livestock and crop sectors. To put figures on how desperate things have become for UK farmers, G's Growers (a large UK salad producer), resorted to booking a £40,000 charter flight to fly in 150 Romanian workers to pick vegetables and help train less experienced recruits. To date, commercial airline Air Charter Service has flown over 1,200 passengers from Romania to the UK to meet the needs of the UK farmers. Exacerbating this problem is the unclear guidance from British government about its immigration plans after December 31, 2020. After this time, the migrant workers will not be able to flow freely between their home countries in the EU, making the labor shortage problem to feed the UK a “double whammy”⁴⁵. David said the timeline to train domestic workers adequately is too short to meet the demand, and that the UK will have to rely on technology to maintain the food supply chain volume, capacity, and productivity.

Though this seems like a UK centric issue, David claimed other European nations are also at risk with Germany having more than 90,000 seasonal workers. Across the pond, it is estimated in the United States that foreign born workers account for nearly 19% of workers in frontline essential industries⁴⁶.

⁴⁴ https://www.farminguk.com/news/farmers-to-trial-new-robot-based-systems-amid-labour-shortage_55857.html

⁴⁵ <https://www.csmonitor.com/World/Europe/2020/0512/A-taste-of-Brexit-Virus-locks-out-UK-migrant-farm-workers>

⁴⁶ <https://voxeu.org/article/covid-19-immigrant-workers-europe>

IMPACTS OF CRO'S, ANIMAL HEALTH ASSOCIATIONS, GOVERNMENT AGENCIES, AND LARGE CORPORATES

Food Protectionism

One huge trend David noted was the increase in countries reducing their dependencies and keeping domestically grown food local. Throughout our interviews we have heard this echoed on the manufacturing segment of veterinary medicines and with PPE that counties are wanting to reduce how much they rely on others. This could compound the economic challenge we are facing at the moment as withdrawal from countries puts added pressure on the food supply chain that has already faced a hard year. David said we are seeing strategic banks and other countries not exporting commodities.

This has proven to be very true for countries who are concerned with food security such as the Middle East and Far East that import more than 50% of their food. For example, because of the impact COVID-19 has had on the food supply chain, within the last 4 months Singapore has declared they will provide 30% of their food products domestically by 2030⁴⁷. David said those countries who import a vast majority of food products are at risk to price spikes based on availability and with the limited growing capacity in country will create a food flux. The main risk to countries will not be because there is not enough food, but the interruption for food provision.

Manufacturing and Regulatory

Carel highlighted over and over again the gargantuan efforts that HealthforAnimals, other associations, and large corporates have enacted in order to get veterinary medicines considered as “essential goods” so that they can continue to move across borders, strengthening supply chains and remaining accessible to veterinarians and pet owners around the world. This is also mirrored in supporting the livestock industry, as HealthforAnimals is working to prevent shortages and maintain smooth distribution of veterinary medicines to the large animal producers and products essential for food safety and security. Behind the scenes, HealthforAnimals is pushing messages to regulators to ease policies and barriers that stunt innovations in animal health. If the industry could continue to get the support, understanding, and flexibility from regulators that they have shown during this crisis, then that would open the door for actual solutions to real problems facing the industry.

From a clinical trial perspective, Klaus Hellman, CEO of Klifovet, said their regulatory consulting business has been operating normally, but they have seen changes in how clinical trials are being handled. Now, surveillance of studies is being done remotely as is much of the data capture. Overall, Klaus has had mixed reactions from his customers about whether trials should move forward. Some cancelled trials are based on the country’s guidance of safe working environments while others decided not to move forward because they were taking advantage of the government subsidies for short working. Klaus says the geographical differences can be seen in other CRO’s. For example, Spain was hit hard with restrictions in that 80% of the work force was in home offices, stifling any progress made in the laboratory.

⁴⁷ <https://www.straitstimes.com/lifestyle/food/grow-local>

Pet Adoption

Richard agreed that anecdotally he has seen the rate of ownership increase, however, he said the hard numbers are hard to delineate as frequency and revenues have been distorted by COVID-19 when practices were not allowed to do any type of neutering during the early period of lock down. Although Richard said he had not seen any evidence that more animals are being bred, he has heard comments that the prices in pedigree dogs increased significantly by some breeders.

This time has given families the opportunity to reflect on many aspects of their home life, and there may be a correlation of families considering owning an animal since they have more free time available. Generally, the industry has seen a steady increase in pet ownership year over year due to the driving forces of the humanization of pets and that people being willing to spend more on their pets. Richard also said this could be a reason why large companies like Mars and Nestle have prevented the veterinary practice ownership because they are keen to promote and develop different types of pet food and nutrition foods for different conditions.

Though the average spend per pet varies from country to country in Europe, the figures that they have been able to gather point to an overall spend increase per pet. Richard said with the time families are spending at home with their pets, owners will more likely be inspecting their pets and identifying more lumps and bumps which could lead to further examinations. Interestingly, equine vet, Silvia Janska, also noted that when clinics were allowed to open again, her practice saw a significant increase in pre-purchase examinations for horses; suggesting people were looking to buy horses and fill up some of the free time they had at home.

Jessica May, from FirstVet, says they have gotten more calls about puppies and kittens, possibly supporting the increase in pet ownership. Since people are staying at home, they are being acutely aware of their pet's health and are calling in about general advice and inquiries. Jessica said one positive that may come out of the pandemic is the great awareness of pet care and an increase in responsible pet ownership.

Large Animal Health Companies and Large Veterinary Corporates

Richard said it was essential during the crisis to guarantee continuation of veterinary product supply which they were able to provide. He also noted manufacturers will need to recognize that veterinary group consolidation is something that will increase for the rest of Europe. For example, in Germany the start of corporate consolidation is happening with groups like Altano who is focused on equine with 17 members and 193 veterinarians to date. Richard states manufacturers will have to recognize that corporates are here to stay

and should be able to drive a better deal, as has been done in the UK. One key challenge Richard revealed, is that most manufacturers tend to operate in country silos, and sometimes species silos, which presents problems for large corporates whose value is offered through variety of clinics, services, and offerings. The buying power that the large corporates have created is formidable and presents a unique opportunity for the manufacturers. Richard said this will be a constant negotiation and partnership will most likely endure several evolutions.

IMPACTS OF CRO'S, ANIMAL HEALTH ASSOCIATIONS, GOVERNMENT AGENCIES, AND LARGE CORPORATES

Preventative Products

Vaccines have always played an important role in both human and animal health and have again taken center stage as the world scrambles to develop a vaccination for SARS COV 2. Carel noted that preventative products are now more than ever relevant, but one essential question remains; if a vaccine is created, who will produce it and at what capacity? This is where Carel truly sees the animal health companies coming to aid in production as they have the potential to manufacture huge capacities of a vaccine that meet human health requirements. Though a vaccine may seem far away, it was reported that the governments in the European Union and the United States have already reached out to

the large animal health companies to examine manufacturing capacities for vaccines. Although harnessing the power of the human and animal health vaccine manufacturing systems sounds like a One Health goal, it leaves a lot of unanswered questions such as, will animal health companies stop producing their products and their vaccines once a vaccine for SARS-COV-2 is developed? Does this mean animal health companies should be stockpiling the animal health vaccines now in preparation for a transition of manufacturing equipment? These questions and more will have to be addressed and written in the One Health contingency plans, which the pandemic has now prepared the world for.

Recovery, One Health, and Sustainability

Carel shared that, anecdotally, the companion animal segment is recovering faster than the livestock sector with the caveat being China, whose livestock markets seem to be rebounding faster. This could be due, in part, to the fact that companion animals are now able to visit the vet's office in many countries and because of the increase in adoptions. Carel highlighted that China is an interesting market to watch as they were just coming out of ASF from the end of 2019 and were the first to go into the COVID-19 crisis. Although China has been hit hard in their food supply chain, Carel mentioned the swine population seems to be recovering as it has been reflected in sales from many of the large corporates in HealthforAnimals.

Carel also emphasized the OIE, WHO, and FAO have put out clear evidence showing there has been no cases of humans contracting SARS-COV-2 from companion animals or livestock; if anything, humans are more of a threat to animals. Carel noted that in order to reach a "new normal" an interdisciplinary approach must be taken to address this global issue.

Large agencies such as the Food and Agricultural Organization (FAO) and the World Health Organization (WHO) are creating a new center which is focused on prevention, spread, and monitoring of zoonotic diseases. This could be a key inflection point for the animal health industry, for the first time, the animal health industry will have a seat at the table in crafting new policies globally. It is estimated that 60-70% of all zoonotic diseases originate in wildlife species with over \$2.4 billion people falling ill each year.

Over 13 years, it has been calculated that zoonoses cost the world over \$120 billion in economic impacts⁴⁸. Typically, the FAO has been focused on agricultural in the developing nations, but with the creation of the new center the aim is to conduct zoonotic work globally. With this new center, Carel highlighted the opportunity to better educate people about food safety, sustainable agricultural practices, and increasing vaccination for preventable diseases. There is a lot of work to be done in the hygiene of meat processing and packing in certain areas of the world as well as unregulated markets such as wet markets.

⁴⁸https://www.oie.int/fileadmin/Home/eng/Media_Center/docs/EN_TripartiteZoonosesGuide_webversion.pdf

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This new zoonotic center looks to address, educate, and create policies globally to address the production of food in a sustainable and safe manner.

Carel said that his key takeaways from the pandemic was that the animal health industry is vulnerable to difficult economics, however, it is one of the more resilient markets and there is already growth in sales in some markets. The acceptance in governments for the animal health sector differed per country but overall, the lead regulators allowed flexibility on regulatory, stockpiling, and availability. As mentioned before, Carel suggested the biggest liability we have seen in the animal health industry would be in the meat packing and processing plants which have taken notable hits in Germany and United States.

Since Germany is Europe's largest pork producer, with over 26 million pigs, Klaus said this disruption will absolutely affect the European pork market. He mentioned that this crisis is different than any of the others we have faced in recent history because it is about science, hygiene, and human interactions. Carel mirrored that statement by highlighting how there has been an increase in awareness on environmental sustainability and human's impact on animals. Moving forward there will be more opportunities, grants, initiatives, policies, and reforms focused on being better stewards of the land, water, air, and animals.

One of the positive elements that Matthew shared was the elements of scientific collaboration which

Increase in Nationalism

Another notable trend that Carel highlighted that has been throughout different segments in this report, is the rise of nationalism and withdraw of collaboration and dependencies. This could be problematic as the more developed countries have the luxury of bringing things like manufacturing and production in country, however, the lesser developed nations who may have been supplying

have been advanced throughout the pandemic. The model of data sharing and transparency, like the John Hopkins COVID-19 Tracker website, and using digital technologies to provide current picture shows what can be done when the right resources are put into place. Another example of scientific collaboration is the GIS-AID genomic platform. This project was born from a G20 initiative which was focused on avian influenza initially. After the outbreak, the team was able to turn it systems to narrow down on over 40,000 human genome sequences, focusing on the molecular picture of the Coronavirus and mapping the spread to geographies.

Another interesting development around science and the pandemic has been emphasis around the speed to publication and the shortfalls of the peer review process. Though this is a necessary verification method, it must be used responsibly and is in need of a restructuring which was showcased during the pandemic. Matthew highlighted the importance in risk communications and crisis communications moving forward; making sure messaging is clear, concise and is not swayed by any politics. Lastly, but most importantly, Matthew shared how this pandemic has shown how fundamentally important One Health is for world health. We should expect and demand to see that veterinary services are strongly linked to national frameworks and crisis management plans moving forward and the push for One Health systems needs to be at the forefront of any big challenges we face from here onwards.

that segment before, are now not only facing an economic recession, they have lost a stable source of revenue. This could lead to furthering the economic development gap between countries and become counter-productive to measures put in place to allow for global trade equity. With these barriers being raised, other issues can emerge such as pharmaceutical manufacturing.

IMPACTS OF CRO'S, ANIMAL HEALTH ASSOCIATIONS, GOVERNMENT AGENCIES, AND LARGE CORPORATES

Currently, most large life science companies can operate globally and move stockpiles around to meet needs. However, if a nationalistic thinking persists, it can prevent the economically disadvantaged from having access to lifesaving medications or vaccinations or the ability to develop them.

Most of the multinational businesses are pushing back against approaches that are focused on breaking international dependencies, as access to products and managing the veterinary medicines supply chain are reliant on these global partnerships.

Roadmap of Lockdown Measures and Impact to Clinics

Richard Fairman said his company was impacted by the pandemic with the inflection point being on March 23rd, 2020 when the UK government issued lockdown measures. Immediately following the announcement, the British Veterinary Association (BVA) and the Royal College of Veterinary Surgeons (RCVS) issued a joint statement and outlined what veterinarians could do in the upcoming weeks, laying out robust restrictions in practice. At that time, vets could only see urgent and emergency cases face to face in clinic. Separately, the RCVS relaxed their rules around remote prescribing which allowed veterinarians to do teleconsultations and to do remote prescribing of drugs.

Outside of the UK, in the Netherlands and Ireland, there were also similar lockdown measures put in place with the caveat that restrictions around remote prescribing were not lifted. Most of the CVS Group's clinics are small animal clinics, which is where they, as a company, were hit the hardest. Less impacted was the farm and equine segment of their business, which is more ambulatory, however, equine had other external pressures. Richard highlighted three other key factors that were responsible for the impact on the equine industry were:

1 THE HORSE RACING INDUSTRY IN THE UK WAS SUSPENDED

- a. A large portion of equine veterinary work is done for the owners and trainers

2 HOBBY HORSE OWNERS WERE ENCOURAGED NOT TO RIDE THEIR HORSES

- a. If a rider were to fall off and become injured, they could be sent to the A&E where they would be taking up a bed needed for COVID-19 patients or subjecting themselves to a COVID-19 environment

3 AS A RESULT OF 1 AND 2 LESS HORSES WERE BEING EXERCISED

- a. This could translate to less interactions with their horses and less veterinary work
- b. In addition, travel restrictions would make it harder for owners who live away from stables to visit horses

This topic was also briefly touched on with BVA President Daniella Dos Santos, who said the equine industry is broken into three main categories hobby and family horses, thoroughbred and high value racing stock, and breeding. She agreed with Richard that pet horses were impacted most severely during the pandemic with the high value reproduction being least impacted.

On March 27th, to de-risk the business impact and protect colleagues, the CVS Group decided to close several sites and take advantage of the government's Coronavirus job retention scheme and furloughed a number of colleagues. The company kept most of the veterinarians employed and furloughed several administrative and nursing roles, as the veterinarians could pick up the slack and do other jobs within the practice.

IMPACTS OF CRO'S, ANIMAL HEALTH ASSOCIATIONS, GOVERNMENT AGENCIES, AND LARGE CORPORATES

This was a hard choice to make but Richard said the nursing and admin roles do not have the power to diagnose animals or prescribe medications. As the lockdown continued, the regulatory bodies reissued their guidance over the mid-April Easter weekend so that vets could start to do some vaccination work and neutering. In mid-May, the RCVS changed their flow chart guidance to vets which pointed

to a return of more normal working practices with the caveat of upholding good social hygiene measures such as social distancing, sanitation, and PPE. Though Richard was not able to share specific numbers, he did say one could expect to see the initial impact as severe on revenues, however, as the guidance changed and evolved from March to May, the impact on revenue was lessened.

Lessons Learned

Richard said the number one takeaway was recognizing that their staff are their biggest asset and priority. Richard claimed the pressure on personnel supply was magnified as there is a known shortage in the UK for veterinarians and veterinary nurses. Richard also noted that regular communication was critical throughout the pandemic as guidelines changed, relaying that information in a clear manner was pivotal for not only direction, but more importantly reassurance.

The key piece about reassurance was echoed in several other interviews with veterinary colleagues and seems to transcend practice sizes and segments in the veterinary industry. This included not just the veterinarians who had to continue working during the pandemic, but also those who were furloughed. Both had very different internal and external pressures that can take a toll on their mental health in a job which already struggles with this challenge. Those who had to continue working were working harder than ever and trying to juggle the roles of veterinarian, admin, and staff along with working in the “new normal” with perhaps a spouse who may or may not be working. The same can be said for those who were furloughed being paid less, not feeling utilized and wondering when and if they could come back to work, both sides with serious challenges.

When asked to describe the industry's response to COVID-19, Richard said he was impressed with just how adaptable everyone, from the veterinarians to the large corporate, have been.

Normally when large corporates have to make decisions, this can take weeks to months, however, he said the industry was making decisions within hours or a day's time, quite a pivot from normal operations. On behalf of CVS, Richard highlighted the passion of colleagues to treat animals and teams have come together doing different roles and working in different locations. Richard claimed that his pandemic has brought their company closer together. Lastly, Richard highlighted that his company is looking at the lack of diversity in the veterinary clinics where only 2-3% of practicing vets are minorities. Richard said they are looking at how the education system is recruiting students to these careers and they are working with the RCVS together to shift the educational piece of the vet career towards other groups of people. When asked about the acquisitions the company had planned, Richard said they are on hold as of now since the business has been focused on keeping its employees and clients safe.

David from Agri-EPI Center said that his lessons learned from the outbreak has been the fragility of the food supply chain when a disruptor comes into the market and the lack of preparations companies and suppliers had to pivot to other markets. A prime example is the dairy market in the UK, where 35 million liters of milk were being produced a day. Normally, 10 million liters goes into the service sector, however, with the collapse of that sector literally overnight, how can we “turn off the tap” in terms of supply? David said nearly 5 million liters sat in waste which led to an inelastic price collapse.

IMPACTS OF CRO'S, ANIMAL HEALTH ASSOCIATIONS, GOVERNMENT AGENCIES, AND LARGE CORPORATES

Going forward, David said it will be pivotal to model these types of disruptions internationally and have resiliency plans in place to handle the supply and demand scenarios. Additionally, David said this was a good learning opportunity for the world to increase efficiencies in the food production systems as well as be accountable for food waste, which has reached 9.5 million tons of waste in the UK for 2018⁴⁹. With the added interest in robotics and automation, David hopes the industry can innovate and adapt more quickly for future disruptions.

One key insight Klaus mentioned was the pool of talent that is available. Through furloughs, forced layoffs, and individuals having time to reevaluate their careers, Klaus said there have never been more qualified individuals looking for work than there are currently. Now is the time to be hiring people, not firing them.

Pet Owner Concerns and Routine Care

Richard said one of the big challenges his company has faced during the pandemic, was the animal owner's frustration. During the early stages, pet owners did not understand the lockdown restrictions had limited the services their clinic could offer. With the veterinary practices opening again, Richard said there are two main factors which will dictate whether pet owners will resume routine care:

- 1 MORE DEMAND FOR UNDERLYING PREVENTATIVE CARE**
 - a. People will have spent more time with the pets and strengthened the bond
- 2 AFFORDABILITY OF PET CARE AND ECONOMIC RECESSION**
 - a. Deciding where to spend money and preventative care will probably suffer most
 - i. i.e. Tick and flea medication, heart worm prevention, vaccinations

At the beginning of the outbreak, Richard said there had been calls coming into clinics when articles were published about companion animals who were suspected to be infected with SARS COV2, however, they fell off as more data became available showing the lack of transmission to humans. Richard said he believes routine care should pick up again and stressed that use of preventative products was necessary to ensure pet welfare and longevity.

⁴⁹ https://wrap.org.uk/sites/files/wrap/Food_%20surplus_and_waste_in_the_UK_key_facts_Jan_2020.pdf

Impact of COVID-19 on the Veterinary Industry

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The Veterinary Industry During COVID-19

As soon as the pandemic started to expand outside of China, groups, and organizations such as the BVA and RCVS started to lobby for veterinarians to be deemed essential services and “key workers”. Within the first three weeks of the outbreak in March, veterinarians could only see urgent and emergency cases. Veterinary clinics had to quickly adapt to meet the social hygiene measures keeping animals and colleagues safe. After the initial three weeks, guidance was given that veterinarians could offer services which were essential for animal welfare such as spaying and neutering.

IMPACT OF COVID-19 ON THE VETERINARY INDUSTRY

For the most part, veterinary practices are open as “normal”, offering almost all the same services as before but still abiding by social hygiene standards. When looking at the industry as whole, BVA President Daniella Dos Santos said the farm animal sector was impacted the least compared to companion animal and equine, partially due to the ambulatory nature of their work and also due to better incorporation of technology into practice. However, the equine practices seem to be impacted the most with a slower rate of return to normal. Below are some statistics of the veterinary profession at the beginning and end of the lockdown restrictions:

- Turnover in farm animal practices:
 - **Beginning:** 47% of farm animal practices reported a 26-50% decrease in turnover
 - **End:** 41% of farm animal practices reported a 26-50% decrease in turnover
- Turnover in small animal practices:
 - **Beginning:** 48% of small animal practices reported a 51-75% decrease in turnover
 - **End:** 51% of small animal practices reported a 26-50% decrease in turnover

- Turnover in equine practices:
 - **Beginning:** 65% reported a 75% decrease in turnover
 - **End:** 53% reported a 51-75% decrease in turnover

Matt Dobbs, Practice Leader Digital Technology from Stonehaven Consulting, said they are starting to see more mature markets fragment and change the story from the large consolidation of veterinary practices. With the telemedicine offerings, smaller clinics can afford similar offering as some of the larger players, flattening the playing field. In wake of COVID-19, they have seen large corporates offloading poorer performing clinics, giving more opportunities to startups in the UK. In fact, the startup rates in the United Kingdom are their highest levels in over 25 years for companion animals with new disruptive models developing on the livestock side. Matt said the real winners in the animal health startup scene will be those who can overlay digital opportunities and can create insight from data that drive veterinary practice to make evidence-based decisions.

Pandemic Puppies and Corona Kitten Adoptions

In the United States, shelters were imploring the community to foster and adopt cats and dogs for fears they would not be able to afford feeding and maintaining the animals during the lockdown. This led to numerous shelters being empty, some for the first time ever. In addition, the more time people had on their hands to stay home and reflect on their families could have encouraged some to add new companions to their household. With kids being at home as well, it is thought that perhaps families decided adding a pet to their home would not only keep the children busy or entertained but also give more time to potty train and spend time together. Overall, the experts we interviewed were hesitant about the adoption rate of dogs and cats during the lockdown period. Daniella commented that the rapid adoptions goes against the messaging the BVA puts out about responsible pet ownership and that pets are for life. There are also several concerns with first time pet

owners who may not have experience in raising a pet and with the lockdown restrictions, may not have access to a vet for general questions or vaccinations which are critical in the early months of puppies and kittens. In addition, vet care can be expensive and when faced with a recession, the experts are concerned if veterinary care will be a priority when families who may have lost income are deciding about critical spend.

Some of the experts predicted there will be a higher incidence of separation anxiety as people return to work and behavioral problems will emerge, as dogs who were once kept inside for 3 or 4 months only interacting with humans are being taken to dog parks where they may not have been properly socialized. Interestingly, Matt noted that they have not seen a huge drop off in pet day care, alluding to the strengthened bond that humans and their animals have which

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was reinforced during the lockdown time. Matt foresees there being an increase in the consumer facing service offerings as families will prioritize their pets in spending even in the recession. Georgia, from Covetrus, gave another perspective in how they are looking to support veterinarians by offering medications in single doses or creating less expensive options for wellness plans which can be more palatable on a monthly basis for new pet owners or pet owners who may struggle with financial decisions during this time.

Though there have been conflicting reasons given why nearly 40% of pet owners do not bring their animals to the vet, the group agreed that access to care is not the reason why and there is no data to support this. Matt suggested perhaps they are not coming in due to financial reasons, however, Daniella offered that education about the value of veterinary care and the value of preventative care is why that population is underserved.

Production Animal vs. Companion Animal Veterinarians and Technology

Paul said the large animal sector was better positioned to withstand the COVID-19 storm from a technology standpoint due to the openness of adoption. The livestock industry has been incorporating technology onto the farm for a few years in the form of biosensors, robotic milking parlors, wearable devices, video monitoring, and audio monitoring. The integration of technology better positioned the industry to adopt teleconsulting quickly and efficiently with veterinarians and monitoring from producers. A key learning was the ability to provide this data to veterinarians and nutritionists to make fact-based decisions quickly and remotely.

A key question that must be answered is *“Have the farmers and vets done enough to address what the data is telling them versus resorting to pharmaceuticals as a crutch?”*

Matt revealed the disruption caused by the pandemic is driving technology adoption and one of the outcomes could be a whole shortening of the supply chain. In addition, the livestock industry’s willingness to incorporate technology has accelerated this shortening as the information collected by the vets are not necessary with automated systems. Traditionally, large animal vets make 60-95% of their revenues through the sale of pharmaceuticals, however, as an industry we are seeing overall revenue streams from dispensing products going down.

Paul agreed with Matt’s point that veterinarians should be used in a consulting role to make decisions with the farmer, which will transition the veterinary industry from a product to service model.

On the flip side of this discussion are the small animal vets and their revenue streams. Georgia argues that there has been a rapid adoption of online pharmacy prescription management by their veterinarians. The platform that Covetrus offers is on behalf of the vet so they get a cut of those products which are sold on their behalf. Through COVID, Covetrus has seen more than 50% of growth on their platform from new clients using those services driven by vets who are wanting to keep clients safe and out of the clinics. Georgia agrees that they are seeing more vets adopt technology solutions now, providing it is within their ecosystem. This means it improves practice workflows, it can be integrated into the medical recording, it improves clinic offerings, and it is able to serve their client base. Daniella highlighted that reason for the stark differences between use technology in small versus large animal sectors comes back to the owners and the keepers. The large animal keepers are more focused on economics and their bottom line, whereas the small animal sector is focused around service and feeling valued by the veterinary practice; thus, the technology solutions must listen to the different segments and make sure their platforms are meeting the individual needs.

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Simon added that for the past 5 years the big animal health companies have started to become more integrated and started to really focus on data and diagnostics. Not only is this something that the veterinarians are asking for, the pet owners are as well. As mentioned before, these large companies are having to change their business model from being solely pharmaceutical companies to offering a diverse portfolio, meeting different needs throughout the animal health supply chain. COVID-19 has only accelerated the interest in this area, as big data analytics for disease prediction and diagnostics has been thrust into the limelight from a One Health perspective. Pen-side testing in livestock animals can save farmers millions of dollars in losses every year

and in-home diagnostics can enhance animal care and welfare through monitoring. Simon mentioned along the same vein of preventative care is vaccines which has become extremely relevant during the Coronavirus pandemic. Lastly, he pointed out that large animal health companies who used to make their money off antibiotics are now having to reposition themselves in other areas as regulatory and consumer demands are phasing out the use of this once commonly accepted additive. All these pressures have accelerated the need for technology integration and reprioritizing of energy for the large animal health companies and the veterinarians that they work with.

Change in Business Model from Veterinary Products to Veterinary Services

Another key topic that kept coming up was the fundamental shift in business models for veterinarians. As mentioned before, conventional veterinary businesses gain most of their income by selling high margin items like pharmaceuticals, however, in the world of telehealth, expertise, knowledge, and advice are the selling features veterinarians. As exacerbated by COVID-19, year over year there has been a steady increase of pet owners moving online to buy veterinary products, potentially cutting the veterinarians out of the revenue equation. This brings to light a new way that veterinarians can create additional revenues as well as enhance offerings and animal welfare, charging for time. Matt asked, *“Is the veterinary profession ready for the change of making its money off just delivering veterinary services?”*

As alluded to earlier, veterinarians are not trained to charge for their time as their business model is not focused around time. As the industry is seeing the shift in consumer buying habits moving to online channels, the large animal health companies are trying to keep up by buying and investing in solutions in this area. The real question will be if

the veterinarians can make the change and if they do, will they be able to keep pace? Gudrun states that even if you stick a platform in front of vet which monitors the time they spent on the phone consulting with clients, they are still going to have to push the invoice button, which can only be done in a behavioral shift of the industry.

Covetrus offers a potential solution as they allow veterinarians to make an online store in which their customers can purchase pharmaceuticals from “their vet clinic”. In this model, the veterinarians make profit from the sales of products on their sites which Covetrus manages, and customers are not going to other e-commerce sites. Matt argued although this is one solution, the competition is stiff with Vets First Choice, Chewy, and PetMedsExpress all being leakage that would normally reside in the veterinary clinic. Georgia highlighted that although those companies exist in the ecosystem there are two models deployed which are #1. Companies that serve the vet practice and #2. Companies that operate as direct to consumer alternatives. One positive outcome that Georgia highlighted was in a recent study that they conducted in canines. Their

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team was able to see an increase in compliance on preventative medications when veterinarians adopted the use of an online pharmacy to increase pet care through renewals and refill of prescriptions being automated. Daniella added that online pharmacies are an alien concept to UK practices and that COVID has tipped the balance on changing the vet's mindset.

Now, veterinarians are understanding that it is appropriate to charge for a phone consult as it is a use of their professional time, knowledge, and experience. All experts agreed this will be part of the "new" business model in veterinary care and that vets will need to have a behavioral shift and proper training capture all the benefits.

Working Conditions for Veterinarians during COVID-19

In the beginning of the Coronavirus outbreak, some veterinarians amongst a list of other essential personnel gained "key work status". This allowed veterinarians to continue working during the lockdown restrictions with access to free childcare. Interestingly, the main segment of the veterinary industry that fell under the "key worker" status was the farm animal vets because they were involved in food production. There was a very small number of small animal vets and equine vets which obtained this status, but they could only offer emergency services.

As mentioned before, farm animal vets were more prepared for working in a telehealth world as they were already working with technology and incorporating it into their normal routine. Farm animal equine vets were quite different as they were only allowed to offer emergency services for the first three weeks of the lockdown. With this, they saw a decrease in turn over by nearly 75% which resulted in many of the equine veterinarians being furloughed. Daniella has seen the small animal and equine vets who have been working throughout the pandemic showed signs of mental, emotional, and physical exhaustion.

The demand for veterinary services did not drop during the pandemic, however, the range of veterinary services that could be offered did. In addition, work is taking significantly longer than it had before, in some cases doubling, putting more pressures on the veterinarian, and creating frustration for the pet owner.

This will need to be another focus area of mental health in the veterinary industry as vets will become extremely overwhelmed playing catch up and possibly dealing with a surge of demand for veterinary care when clinics are fully operational.

On the flip side are the veterinarians who were furloughed and are now slowly returning to work. Some of those who were furloughed were done so because they had the primary childcare responsibilities. Because these vets were staying at home all day, the added angle of social isolation had the potential to compound and weigh on the minds of those in a profession which is ripe for mental fatigue. Daniella shared that even with a return to work, the furloughed vets face a new work environment with new ways of working.

The vet office has transformed into a completely different business where clients are not allowed in the building and teleconsulting is the only way to communicate with a pet owner. This puts an extreme amount of stress on the veterinarian who is missing the social interactions with their clients and the pet owners who value the physical relationship with their vet. Gudrun echoed these points and stated vets in the furloughed category should be made even more of a priority as they could be having thoughts of insecurity, feeling not as worthy as vets that were "essential", feelings of guilt, and even may have some resentment from colleagues who did have to work through the pandemic. All these factors could lead to further challenges on the mental wellness of veterinarians.

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As work returns to “normal”, we are seeing at the vet office as an intersection of two groups of veterinarians who are exhausted but for different reasons. Daniella highlighted this is an area the vet industry will need to monitor as the field is enduring a mental health crisis even before the pandemic and working pressures now will only intensify it.

Silvia Janska, an equine veterinarian, said her clinic has been working 24/7 to keep up with all the back logged work. Routine procedures such as vaccines and dentals have demanded more time than usual with the added stress of the spring and summer being the seasonal time for equine breeding. Silvia noted that this has created an even heavier

workload on the vets who were not furloughed during the lockdown restrictions as they were having to do their regular duties during breeding season with reduced veterinarians and furloughed non-vet staff. Silvia highlighted the importance of the mental health for these vets who have been working non-stop and just how critical it is to give options such as flexible working or bigger gaps for on-call time to ensure a sustainable mindset. In fact, some vets have reported that the added work has created feelings of resentment as they felt the demand to increase the business turnover was put before the veterinarian’s wellbeing; possibly leading to growing retention problem where there is a seven-year limit for veterinarians in clinical practice⁵⁰.

Impact of COVID-19 on Working Women Veterinarians

Pre-COVID, A double-blind randomized study was recently released which interviewed 216 managers who oversaw recruitment decisions for veterinary practices. They were shown 2 identical CVs with the only difference being the names of the applicants: Mark and Elizabeth.

In a shocking discovery, the study revealed that overall, the woman applicant was paid significantly less, seen as less competent, was not likely to push for promotion, and less likely to be a valuable source of information. These responses were significantly higher for the managers who thought that women did not face discrimination in the workplace. Even in a profession where women make up 80% of the workforce, the pay differential and perceived skills differential still exists. A feared outcome, which has been revealed through the pandemic, has been the loss of progress women have made in the workplace.

Many studies and articles have been released in other sectors noting that more women are having to reduce their work hours or offer to be furloughed to take care of the children since childcare facilities have shut down. In fact, Boston Consulting Group published that woman have added 15 more hours per week than men to do tasks such as distance learning or other childcare demands⁵¹. Another study indicated that 14% of women are thinking about not returning to their jobs due to childcare demands⁵². Daniella highlighted that the veterinary profession, overall, is not paid well so if a family is having to decide who resumes work and who does not, usually the veterinarian is not the winner. Gudrun also stated that the veterinary profession is inherently inflexible in the working schedules and so retention rate of vets drops by 50% before their fourth year of clinical practice. She also pointed out, that even though most of the vets are women most of the key decision makers and leaders in the industry are male.

⁵⁰ <https://veterinaryrecord.bmj.com/content/182/18/496.1>

⁵¹ <https://www.bcg.com/publications/2020/helping-working-parents-ease-the-burden-of-covid-19.aspx>

⁵² <https://www.surveymonkey.com/results/SM-67XBXYX7/>

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Pet Owner Concerns

Lastly, pet owners who are normally at work have been shifted to pet owners who are now at home and watching their pets doing things they did not think they normally did. Daniella said clinics were getting calls of concerned owners asking about the number of times a cat should scratch itself in a day or how long a dog should sleep. These calls might have stemmed from people being anxious in general or just being home and interacting with their pets more. In the beginning of the pandemic, when vet clinics were only able to offer emergency care, calls were coming in about vaccinations of animals. When pet owners were told they would have to delay vaccinations until restrictions are loosened many vet clinics received abuse or frustration from their clients. This became so frequent the BVA had to issue statements to pet owners urging them to be flexible and understanding in this unprecedented time. Other calls came into the practices about whether pets could become

infected with or transmit the Coronavirus. They saw a substantial amount of concern particularly around the time the news articles were coming out with information about the suspected SARS-COV-2 infected dog in Hong Kong and suspected infected cat in Belgium. The next most frequent calls were about neutering pets, which could only be done for urgent population control measures. Daniella said as soon as hairdressers could be open, clients were calling clinics wanting to come into the practice. This was not feasible as veterinarians on average see 4 patients an hour and do 15 consults a day. This amount of people, with their dogs and/or kids would not meet proper social distancing standards and would put the vets, staff, and pet owners at risk. Equine vet, Silvia, said the most frequent call they received initially was increase payment for restarting vaccination schedules and if their horses would be vaccinated in time for competitions.

