

Disruptors and Innovators 2023

A closer look at the ongoing rise of animal health start-ups



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About the Author

Amanda Burkardt earned both her bachelor's degree in animal science and her master's degree in animal molecular biology from Oklahoma State University (OSU), as well as a Master of Science in information technology and a Master of Business Administration from Oklahoma University. She has over seven years of laboratory experience in the US and internationally in various scientific fields and spun off a company based on her work at OSU focused on alternatives to antibiotics. Through her experience, she formed a consulting firm that advises investors, scientists, entrepreneurs, universities, and large corporates in evaluating technologies for start-up opportunities, as well as developmental, partnership and commercialization strategies. Amanda also works with a large network of angel investors and venture capital groups across the world scouting for innovation and disruptors in the life science, animal health and agriculture industries.

Through her immense and multinational networks, she uncovers value gaps and conducts market discovery by putting together large due diligence reports for investors to examine scientific merit and product opportunity for emerging innovation. With her company, Nutriapeutics Consulting (www.nutriapeutics.com), she has consulted the largest animal health companies in the world and institutions in the industry. She is frequently involved in industry-wide speaker series, judging panels, newsletters, articles, podcasts, webinars and reports. Amanda is currently working with clients in the US and internationally and has a passion for innovation in science and technology. With her leadership, Nutriapeutics Consulting helps innovators and large corporates discover, develop and fund products that will turn research into return.

About the Contributors

This **S&P Global** report was authored using the knowledge and understanding of the animal health start-up landscape of **Stonehaven Consulting** (www.stonehaven-consulting.com). Established in 2015, Stonehaven's team of expert consultants and network of potential investors, buyers and sellers have partnered with life sciences companies to go beyond traditional consulting models. The Swiss company has a one-of-a-kind database that features hundreds of start-ups in animal health. This platform was used to help populate this report with the latest trends and data.

Stonehaven Consulting is a long-term partner of S&P Global. The two businesses have collaborated on market sizing, data, reports and more for the animal health industry.

Chapter 1: Executive Summary

1.1 Rebound, resurge, recession: A lifetime of animal health activity in four years

This year marks our fourth Disruptors & Innovators report, which examines the starts-ups that are forging trailblazing innovations in 2022 and beyond. It also explores the investment activities that are supporting these young companies.

A lifetime of history has already happened in the animal health industry during the span of a few short years, with some of the largest initial public offerings and acquisitions ever on record – even in the face of economic instability. As is well known among insiders, there are not many comparable industries quite like animal health. It is a sector that has proven to be reliable and resilient and will once again be put to the test in the face of a possible upcoming recession. Animal health represents a potentially more predictable area to invest in compared to other segments such as the crop science space, which is at the mercy of external factors and the environment.

Over the past 12 months the animal health industry has seen the pendulum swing from some of the largest Series B raises ever completed in the sector, to current-day settings where investor confidence is waning, company valuations are tanking and the market is buttoning up for tight margins and recession-like conditions.

In this report, we cover how there has been a drastic change in the way innovations in animal health have evolved and how the investment appetite has also increased to meet those changes. Innovation in animal health products has changed from capital-intensive undertakings that were only feasible for large corporates, to ideation and agile business models that any determined entrepreneur could reach. Many major businesses have shifted to a strategy that utilizes external research and development to fulfil a demand for blockbusters and tackle product patent expirations.

Animal health has always been seen as the proverbial ‘little brother’ of the life science space, as many leading players were originally a smaller wing of a large human health company. This has become less true, as monumental splits by animal health units from their parent companies have occurred, with Zoetis leading the pack in its impressive spin-off from Pfizer in 2013 – the second largest initial public offering that year in the US at \$2.2 billion. This trajectory is echoed in blockbuster products or goods that have reached over \$100 million in revenues (although this threshold might be evolving to nearer \$1 billion in animal health, with the onset of a new wave of innovation such as monoclonal antibodies). The first ever blockbuster product in animal health was Merial’s Frontline flea and tick control in the early 1990s, with Bayer Animal Health’s flea and tick product Advantage seeing a similar success in the early 2000s.

After the demonstrated success of these milestones, a windfall of blockbuster products followed suit, such as Bravecto, Simparica, Credelio, Apoquel and Cytoint. Although all these products came through internal R&D, they face major issues, including generics competition as they go off patent, the \$50 million to \$100 million price tag for development, and the 7-12-year time drag to bring an animal health drug to market. In fact, since Frontline went off-patent in 2010, its sales have dropped from a peak of around \$1 billion to \$426 million as of 2021. However, not all this loss was through generic competition – manufacturers have been keen to focus on their next-generation products as well.

Some of the large animal health companies are aiming to have 50% of their growth generated by innovations. Elanco expects \$100 million to \$130 million of growth to stem from external innovations in 2022. This will also

be driven by connecting pieces of the industry that are not normally paired, such as coupling genetics with data analytics to uncover insights about precision medicine and nutrition.

Instinctually, large animal health corporates understand the need for partnerships and acquisition of new ideas to fill growing demand and have been relatively prolific in their M&A activity. Elanco has made bold moves – large and small – from acquiring all of Bayer’s animal health assets for \$7.6 billion, to development of companion animal cancer products with start-up VetDC, and monoclonal antibodies for dogs and cats with Aratana Therapeutics and Kindred Biosciences. Boehringer Ingelheim has been very active in partnering with start-ups in areas ranging from stem cell therapy – like its licensing with and subsequent acquisition of Global Stem cell Technologies – to monoclonal antibody partnerships with PetMedix, Invetx and MabGenesis. Lastly, Zoetis has also shown its partnering prowess as it has also collaborated with PetMedix and Trianni for monoclonal work, in addition to recently acquiring feline genomics company Basepaws and livestock data management company Performance Livestock Analytics.

Many of the above transactions are covered in great depth in this report and have happened within the past two years, signaling again just how robust and resilient the animal health industry is. It would be remiss to not mention the effect the COVID-19 pandemic has had globally on animal health – highlighting some of the biggest trends, such as the strain on international food demand, disjointed supply chains, labor shortages and automation fulfillment, manufacturing and production bottlenecks, record-breaking pet care spending, novel approaches to accessing veterinary care, robust sustainability initiatives, a catalyzed surge in e-commerce (as well as at-home offerings) and the unprecedented spike in pet adoptions worldwide – just to name a few.

However, it is evident there is no clear-cut end to the pandemic and we may not ever know what a ‘post-COVID’ world truly looks like, as lingering and tail-end effects are still very much rapidly evolving and becoming part of our everyday life. To this end, forecasts and figures included in this document have been calculated without the assumption of a ‘hockey-stick’ market recovery and have utilized a more linear projection.

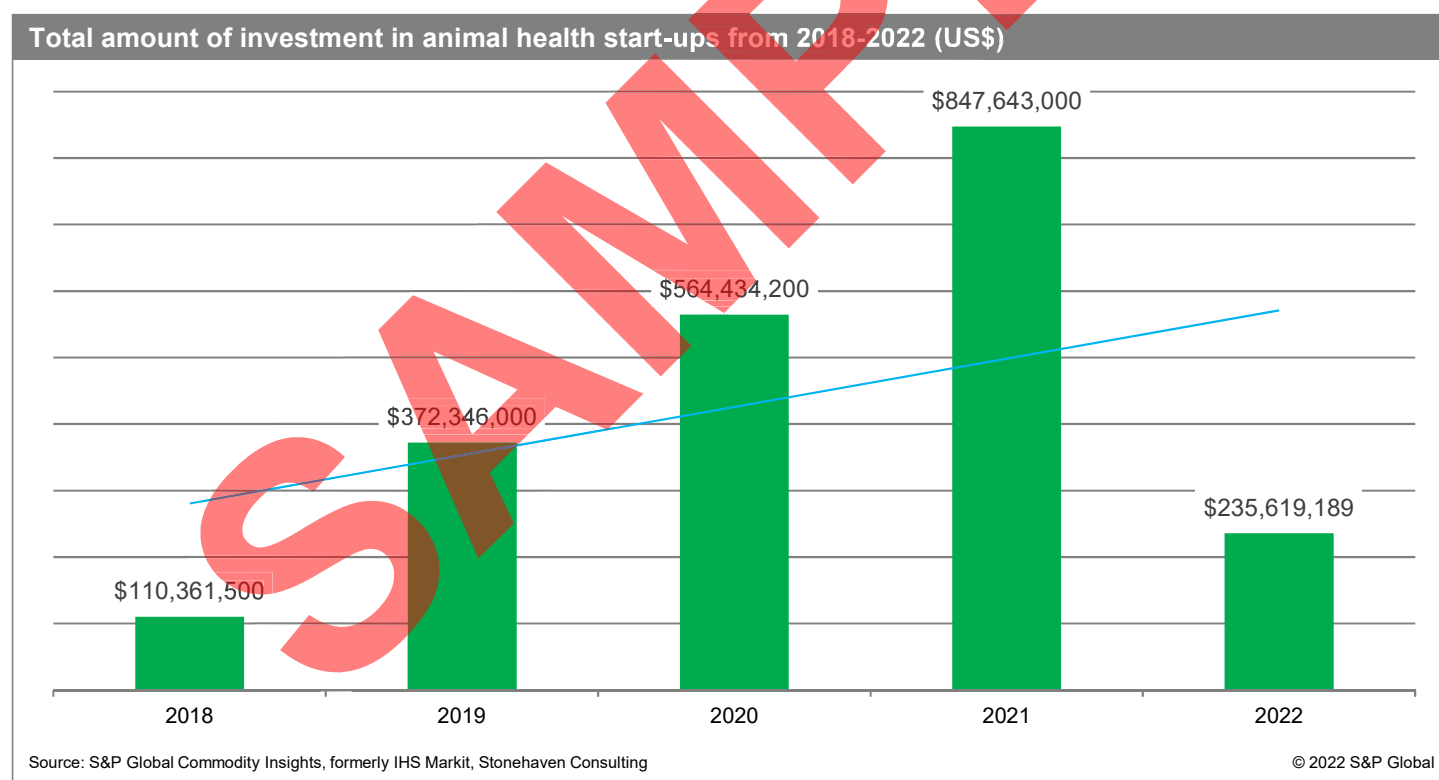
Impressively, since the last publication of the Disruptors and Innovators in 2021, we are pleased to report – even in the face of market uncertainty and the pandemic, investors, large corporates, and start-ups alike have been just as active, if not more so, during the course of the past 18 months. Below is an overview of our previous reports, as well as a brief update of the animal health landscape to date.

Chapter 4: Outside the Top 20 – An Industry Overview of Innovators and Investments 2018-2022

It comes as no surprise the past four years of activity in the animal health industry have been a wild rollercoaster ride. We have seen swift moves from normally slow large corporates and multiple exits that are more comparable to the usual landscape in human health. There is no denying the animal health industry is on fire and will not be extinguished anytime soon.

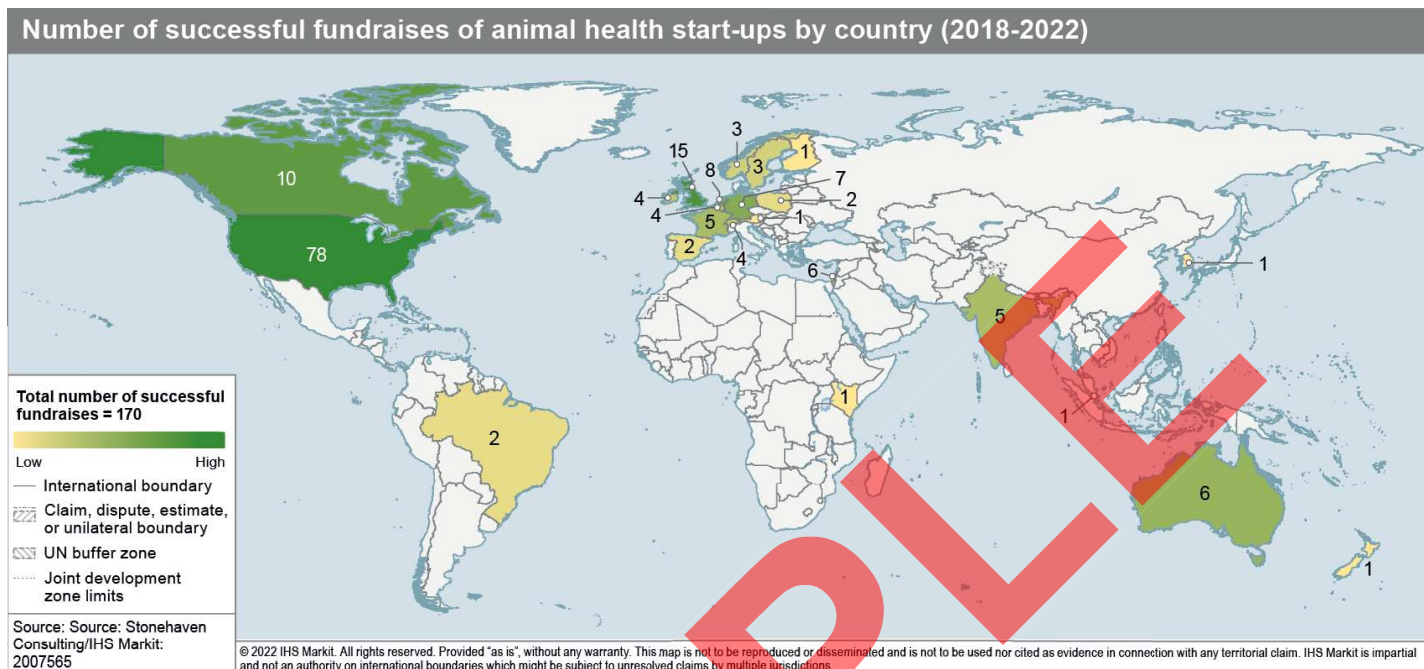
Throughout these past four years, over 170 deals were disclosed, with total activated capital deployed as investment in animal health start-ups surmounting to just over \$2.2 billion – nearly half of all deployed capital in the history of animal health early-stage investments. All the figures in this report take into account disclosed deals only with the assumption these numbers have a slight margin of error. Not all transactions or fundraises are revealed. Thus, their monetary value has been kept confidential and is not included in the below figures.

Figure 3. Total amount of investment in animal health start-ups 2018-2022 (US\$)



In 2018, around \$110 million was invested in over 30 animal health companies, with aquaculture and remote monitoring making up over one third of all investments. The biggest raise that year was seen in human and animal health company Recombinetics, with a Series A round of \$34 million for its gene editing technology that enabled a spin out of the firm's agricultural division, forming Acceligen. In March 2022, Acceligen's CRISPR technology and gene-edited beef cattle were the first to be authorized by the FDA as "low risk" and will not require a pre-market approval for a gene-edited animal for food use – paving the way for future gene-editing in food animals.

Figure 4. Number of successful fundraises of animal health start-ups by country (2018-2022)

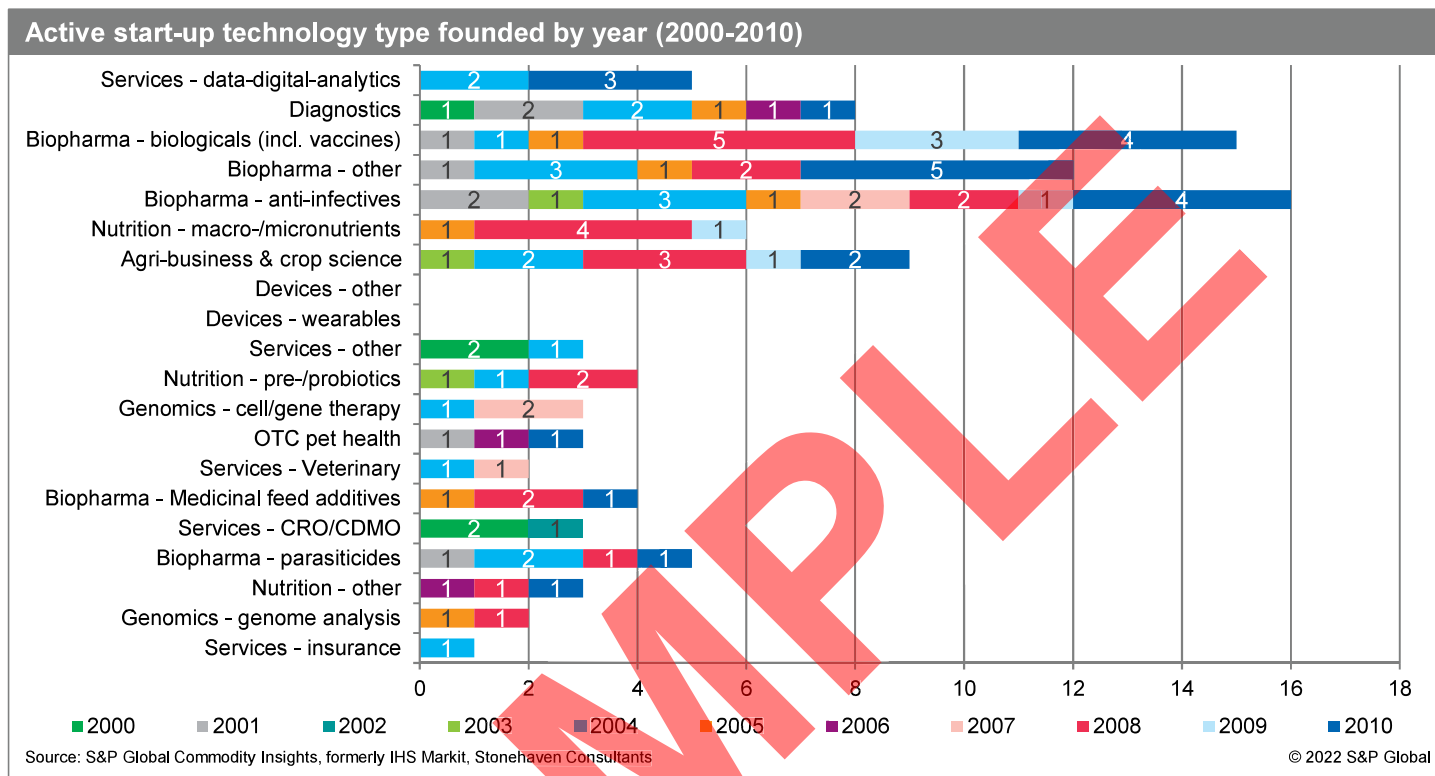


It is not surprising the majority of successful raises were obtained by start-ups located in the US, Canada and the UK, as this has been the historical trend. Nearly half of all the raises completed in the past four years happened in the US, with a staggering 78 deals completed. However, the top countries from a number-of-deals perspective are not the same top countries from a dollar-raised angle. For example, the most money secured by start-ups was led by the US at \$1 billion, followed by France at \$580 million, the UK at \$137 million and Australia at \$87 million disclosed dollars. This highlights the fact although there may be more deals in a given country, the average amount of dollars bagged is dependent on a company's ability to fundraise.

Outside of the top three, the countries with the most start-up deals in 2018-2022 were the Netherlands at eight, Germany at seven, Israel at six and Australia at six. Even though countries like Switzerland and Ireland both had four start-ups that successfully fundraised, their totals in each country amounted to \$7.7 million and \$5.1 million, respectively. The difference in amounts raised is exacerbated when compared to countries like New Zealand or South Korea, which only had one deal each but saw a total raise value of \$8.6 million and \$15.4 million, respectively. Thus, even though there are smaller markets than the US and UK, there are emerging sectors with start-ups that are able to secure large sums of money in non-traditional geographies. This is extremely true of rapidly developing nations such as India, where five animal health start-ups were able to successfully snare \$32.8 million, impressively matching Austria at \$32.8 million raised with only one deal.

agribusiness. The following year was also relatively active with seven animal health companies being established – again with a focus on anti-infectives, biologicals and medicinal feed additives.

Figure 9. Active start-up technology type founded by year (2000-2010)



In 2006, only three companies were established. However, this would mark the third year in a row a new diagnostics company was formed. The following year saw five animal health companies formed – half established to develop anti-infective solutions and the other half in gene therapies. Most interestingly was 2008, where 23 companies were set up, with five developing novel vaccine platforms.

There were three start-ups formed in the nutrition ‘other’ category, which includes start-ups like ProAgni and Folium Science. These start-ups are not like the regular nutrition companies, which focus on pet food and feed additives. Rather, they are formulating antibiotic-free supplements for livestock and developing a platform to target specific bacterial strains and removes them from livestock – curbing the rise of drug-resistant bacteria.

It is interesting to note activity in 2006-2009, as not only was this a trying time economically due to the 2008 financial crisis, but there were also several major outbreaks that shifted the sector’s focus from reactive to proactive care. This was primarily due to the H5N1 avian influenza virus outbreak from 2006 to 2007, and the H1N1 swine flu outbreak in 2009.

During 2006-2007, over 230 million birds died and there was a shockingly high associated human mortality rate of 60%. In addition, legislation during this time was passed that banned the use of medically important antibiotics as a prophylactic measure in animal feed in the European Union. These factors spurred on the creation of two new medicinal feed additive companies and six new microbiome companies.

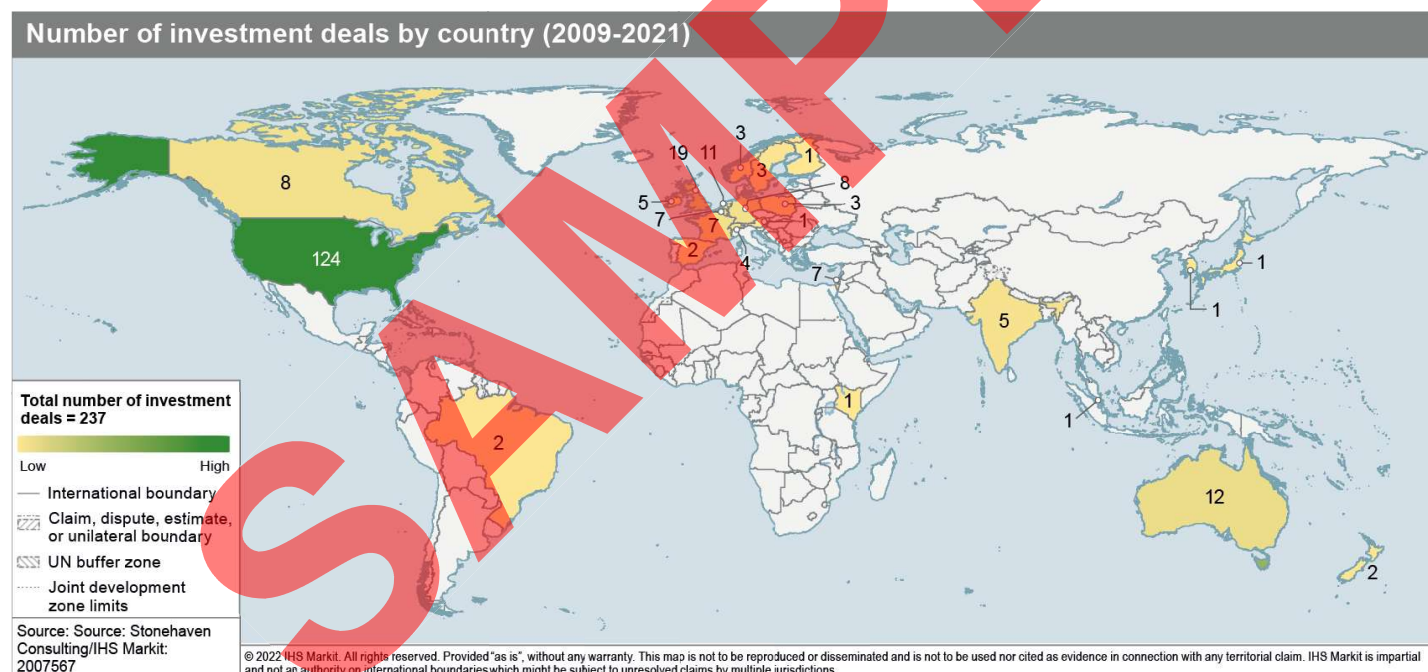
Following shortly after was the infamous timeframe of 2007-2008, which saw one of the worst financial downturns of the century. Home prices plummeted, economies across the world tanked and inflation shot up to

Chapter 6: Review of Investment and Innovation from 2009-2021 in Animal Health

Innovation in animal health is as old as animals being domesticated and obtained for human use. The S&P Global team has been recording transactions in the animal health industry since 2009. This section provides a wider lens to look at innovation and investment across the decades. It is clear some geographies have an enduring presence when it comes to start-ups and funding in the animal health industry. However, there are several emerging markets that are proving to be formidable players in the wider ecosystem.

Below we analyze historical data of investments and innovations in the industry across time and see how investment thesis, categories, indications, therapeutic areas, species, dollar sizes, valuations and interest have evolved and adapted. In conjunction with Stonehaven Consulting analysts, we have prepared this section to give one of the most comprehensive overviews on innovation and investment in animal health.

Figure 19. Number of investment deals by country (2009-2021)



Looking at investment dollars from a geography standpoint, it is probably not surprising that the lion's share of investment has historically come from the US. Out of the 251 disclosed investments totaling over \$3 billion that happened from 2009 to 2022, 50% or 124 deals were from US-based start-ups, followed by the UK at 19 deals and Australia at 12 transactions.

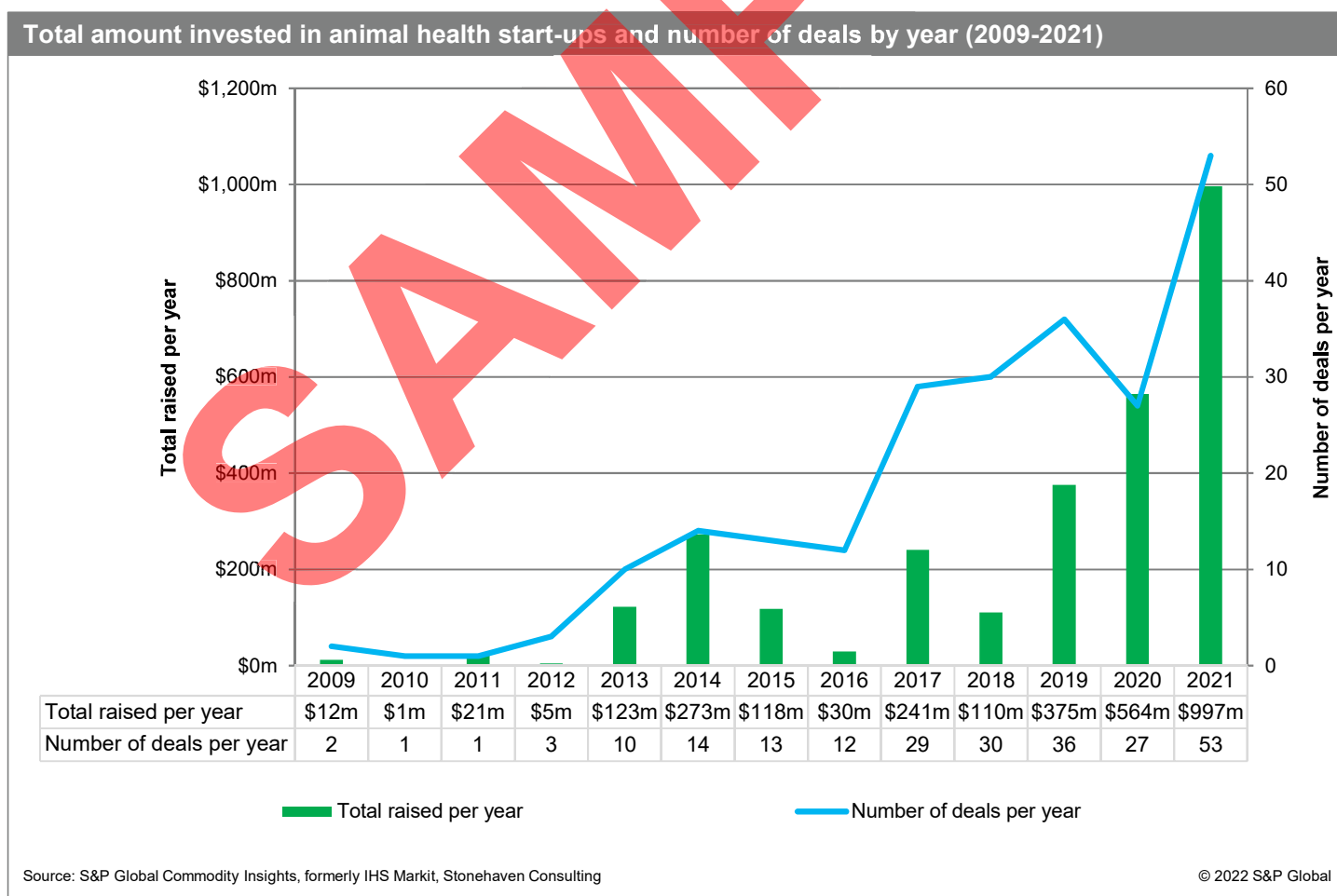
Interestingly, the top 10 geographies with the most investment dollars in animal health start-ups were not the same top 10 countries with the highest number of deals. For example, there were 19 UK start-ups that successfully fundraised for a total amount of over \$107 million. France, on the other hand, only had seven start-up raises but the second largest dollar investment size, with over \$500 million invested. This could mean start-ups that raised in countries with less deals but higher values were better at securing international capital. On the flip side, it could

animal health industry – moving into the same playing field that was once only owned by human health. These transactions in 2014 are not particularly surprising, as Zoetis split from its parent company (Pfizer) in the year prior and went to IPO at \$2.2 billion – the biggest public offering since Facebook.

In 2017, sizable investments were also seen with equity offerings, Series B and D funding for animal nutrition companies Amyris and Calysta and microbiome company Evolve Biosystems. These three start-ups all impressively raised over \$20 million each, with Evolve snagging \$40 million. Just two short years later in 2019, several emerging companies had significant Series A and B funding events, such as a \$50 million raise from RNA technology company Green light Biosciences, a \$20 million raise from pet gene therapy company Scout Bio and a \$10 million raise from fish health company Aquabyte. Clearly, 2021 was an unprecedented year with money moving quickly and fiercely in the pet and livestock space. We will dig deeper into those transactions in the following section.

There have been only a handful of Series C financing deals in the animal health sector to date. In the last 10 years, prior to Targan’s recent backing, S&P Global has only tracked six Series C rounds. These include investment in companies such as Aratana Therapeutics, Advanced Animal Diagnostics, Putney, Stellapps, Algenex and Ynsect. While there have been five Series B rounds so far in 2022, Targan’s investment is the first animal health Series C of the year.

Figure 21. Total amount invested in animal health start-ups and number of deals by year (2009-2021)



Customer Care

CustomerCare@ihsmarkit.com

Asia and the Pacific Rim

Japan: +81 3 6262 1887

Asia Pacific: +604 291 3600

Europe, Middle East, and Africa: +44 (0) 1344 328 300

Americas: +1 800 447 2273

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