Canine and Feline Vaccines Market 2020-2035

Animal Health Market Analysis, 2022

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Animal Health | Special Report

Special Report

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Chapter 1: Summary

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Scope of the Report

The report breaks down the market[1] by species, composition, WSAVA category and key markets

By Species	By Technology	By Composition	By WSAVA Category	By Key Markets
Dog **Cat**	**Conventional vaccines** **Innovative vaccines** N.B.	**Multivalent vaccines** **Monovalent vaccines**	**Core vaccines** **Non-core vaccines**	**US** **EU-5**[2] France Germany Italy Spain UK **APAC-3**[3] China Japan Australia
Years of Interest	**2020** to **2035**			
Currency	The currency used in the report is **United States Dollars ($)**, with the market size indicated in terms of $ million/billion. The market size figures in the report are **ex-manufacturer sales** based on 2022 prices.			

N.B.: We define innovative vaccines as vaccines based on novel approaches (e.g., mRNA and DNA vaccines) and/or those targeting new therapy areas (e.g., non-communicable diseases and cancer) i.e., these vaccines are yet to be commercialized in companion animals. The market figures in this report pertain to conventional vaccines only. While we acknowledge the CAGR of the total companion animal vaccines market are likely to increase significantly once innovative vaccines enter the market, we have omitted this nascent segment from the market model given high uncertainties around its potential pricing and potential to serve unmet needs. We present the implications of innovative vaccines from a qualitative perspective in this report (please refer to 'Chapter 6: Competition and Innovation' in the report). For future editions of the report, we will look to reflect the quantitative impact of innovative vaccines, hopefully, by which time, such vaccines will have been commercialized, serving as a base for market projections.

[1] The report only covers vaccine products; it does not cover diagnostics, devices or other forms of interventions involved in the delivery of vaccines; [2] The five European nations represent ~50% of the European animal health market; [3] The three APAC nations amount to ~70% of the APAC animal health market.

Executive Summary (1/3)

The conventional canine and feline vaccines market is forecast to grow at +X% CAGR (2020 to 2035)

Note: *The market figures in this report pertain to conventional vaccines only. While we acknowledge the CAGR of the total companion animal vaccines market are likely to xxx xxx.*

Overall

The overall market is forecasted to grow steadily over time

The conventional companion animal vaccine market in the **nine key markets** is projected to reach **$XX billion** by 2035, growing by around **XX%** from **$XX billion** in 2020. This translates to a **CAGR of X%**. This market is highly consolidated, with **~X%** of sales driven by the top four animal health players. Factors such as growth in companion animal ownership, increasing number of veterinary practitioners, rising income levels in developed economies, increasing prevalence of established infectious diseases and other emerging pathogens are expected to drive the growth of the market.

However, we believe such growth drivers will be partly offset by increasing levels of vaccine hesitancy, ageing pet populations and restrictive regulatory frameworks. Overall, the canine and feline conventional vaccines market is set to grow in the coming years at a steady rate.

Market by WSAVA category

Core vaccines will continue to dominate the market

The World Small Animal Veterinary Association (WSAVA) categories vaccines by level of need: ‘core’ and ‘non-core’. Core vaccines accounted for **X%** of the overall market in 2020 and the segment is expected to reach **$X billion** by 2035 at a CAGR of **+X%**.

The large market share that core vaccines comprise can largely be explained by higher compliance rates of core vaccine than that of non-core vaccines. Many multivalent vaccines contain multiple core pathogens, and general uptake of multivalent vaccines is higher than that of monovalent vaccines. Moreover, emerging zoonotic pathogens or established pathogens increasing in prevalence will likely be defined as ‘core’ by some national veterinary associations.

Non-core vaccines accounted for a smaller segment of the market with **X%** share in 2020 and is expected to grow steadily to **$X billion** by 2035 at a CAGR of **+X%**.

Market by vaccine composition

Multivalent vaccines will continue to comprise the largest market segment

The multivalent segment accounted for the largest share of the overall vaccines market in 2020 with **X%** and is expected to decrease slightly to **X%** by 2035.

The large market share that multivalent vaccines comprise can be explained by the fact that many combination vaccines are core, and because it is more convenient and cost-effective to immunize against many pathogens with one vaccine than to administer multiple monovalent vaccines. However, monovalent vaccines are a significant presence in the market owing to challenges in containing multiple pathogen strains in a multivalent vaccines.

However, the monovalent market size is variable and dependent on the territory. For example, the monovalent US vaccine market stood at **X%** in 2020 and predicted to rise to **X%**, at **$X billion**, by 2035. Whereas the EU-5 monovalent vaccine market size is predicted to rise to **$X billion** by 2035, comprising **X%** of the market. This is due to rabies being a mandatory vaccination in the US and not in the EU-5. Dog and cat rabies vaccinations are most commonly available as monovalent vaccines.

Executive Summary (2/3)

The conventional canine and feline vaccines market is forecast to grow at +X% CAGR (2020 to 2035)

Market by Species

The market sizes for dogs and cats will grow at similar rates

The dog segment accounted for the largest portion of the sector with **X%** share of the market in 2020 and is expected to grow to **$X billion** by 2035 at a CAGR of **+X%**. The cat segment, with **X%** share of the market in 2020, is expected to grow to **$X billion** by 2035 at a CAGR of **+X%**. The higher share of dogs is largely driven by the broader range of vaccines available to them. The similarity in growth rates are driven by similar increases in cat and dog population sizes (at **+X%** CAGR for dogs and **+X%** CAGR for cats).

Market by Region

APAC has the highest CAGR of any region

The US dominated the vaccines market in 2020 and is expected to retain the largest share in 2035, driven by the vast population in the region, high compliance rates, high disposable incomes and government vaccination mandates for rabies. However, APAC is predicted to grow the fastest out of the three major regions. China is expected to provide significant growth opportunities for players. This can be attributed to growing pet ownership, improved awareness of treatment options and growing manufacturing capabilities. Although the smallest market, the EU-5 is more profitable than the US market.

Innovation Pipeline

Innovation will come from improved safety, vaccine delivery, strain adaptation and manufacturing process modifications

Regulatory barriers, high research costs and high brand loyalty largely discourages the innovation of new antigens or vaccine platforms for established pathogens such as parvovirus or distemper. Instead, innovation is expected to focus largely on manufacturing efficiencies, vaccine delivery format, update of strain variants and safety and duration of immunity (DOI).

We expect to see innovations that enable vaccines to be manufactured in more cost-effective ways. There has been a recent drive to switch from roller bottles to modern bioreactors and improvements in leptospirosis fermentation processes. We also expect to see improvements in purification and the use of better-defined media. Orally administered vaccines will become more common due to the convenience of administering them. The safety of established vaccines will be further improved by optimizing media composition, purification and eliminating adjuvants. The safety of established vaccines will be improved. Reducing side effects will likely increase compliance rates.

Novel vaccine platforms, although somewhat prohibitive for established pathogens such as parvovirus, may be applied for neglected pathogens such as feline immunodeficiency virus (FIV) and feline infectious peritonitis (FIP).

Innovations from the human space such as DNA, RNA and virus-like particle (VLP) technologies may one day be translated into the companion animal market, especially by small companies and/or driven by university-funded research. If these technologies go onto address truly unmet needs (rather than simply penetrating the existing market), we may see step-change growth in the companion animal vaccines market that is above the growth rates we see in this report.

Upsides not reflected in baseline model

Other technologies and pathogens need to be explored

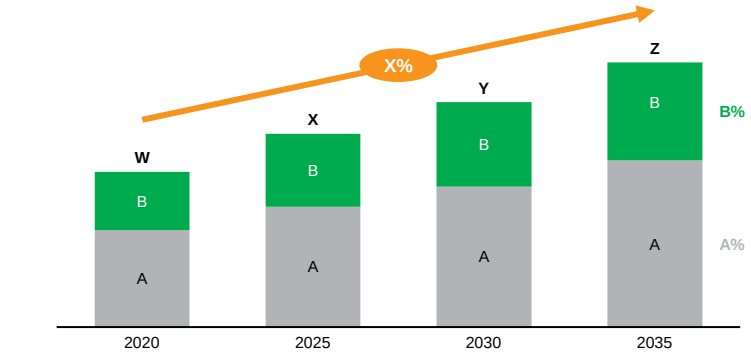
Market growth will also come from other areas:

- Therapeutic vaccines that can treat conditions such as atopic dermatitis and osteoarthritis may present significant opportunities for manufacturers and will likely be used in place of more expensive options such as monoclonal antibodies. Innovation in therapeutic vaccines is being driven by smaller companies
- Climate change and ecological transformation due to urban encroachment will cause a rise in prevalence of emerging zoonotic pathogens and widening distributions of pathogens such as rabies and vector-borne diseases

Executive Summary (3/3)

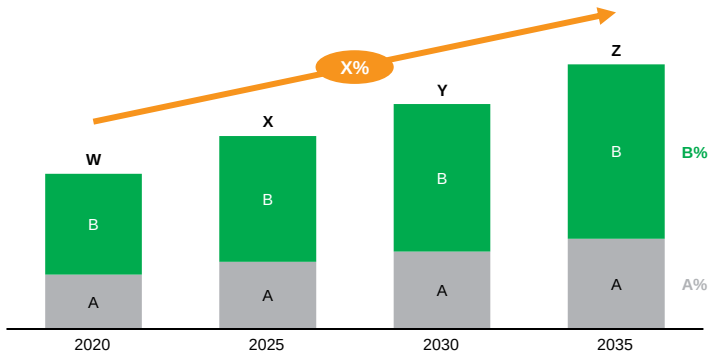
The conventional canine and feline vaccines market is forecast to grow at +X% CAGR (2020 to 2035)

Canine and feline vaccines market by species ($m)



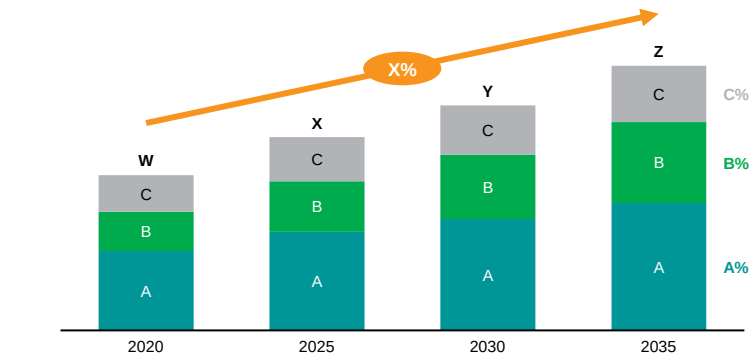
Source: Stonehaven Consulting

Canine and feline vaccines market by WSAVA category ($m)



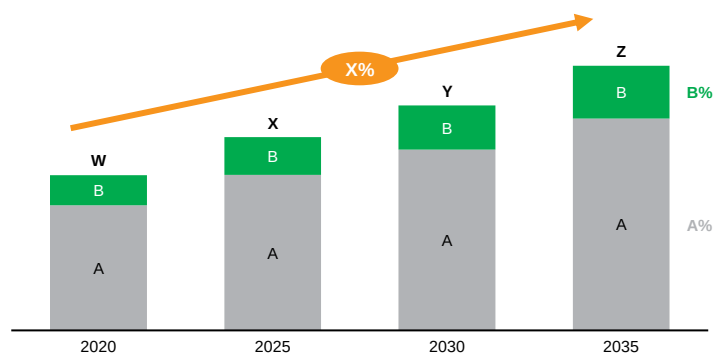
Source: Stonehaven Consulting

Canine and feline vaccines market by region ($m)



Source: Stonehaven Consulting

Canine and feline vaccines market by composition ($m)



Source: Stonehaven Consulting

Chapter 2: Regulatory Landscape

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Regulations for Vaccines Approval (1/2)

Regulatory frameworks need to be updated to incentivize innovation in the vaccine market

Overall

Numerous regional and international organizations govern the technical requirements and standards for vaccine registration. The registration of vaccines is usually overseen by the country's drug regulatory authorities.

« More information about vaccines approval »

US

The Center for Veterinary Biologics (CVB), operating under the United States Department of Agriculture (USDA), is responsible for the regulation of animal health vaccines, including immunotherapeutic.

« More information about vaccines approval in US »

Europe

The Committee for Medical Products for Veterinary Use (CVMP), operating under the European Medicines Agency (EMA), regulates veterinary pharmaceuticals and biologics. Regulations in the European Union were updated in early 2022.

There are four ways to approve a product in the European Union:

« More information about vaccines approval in Europe »

Regulations for Vaccines Approval (2/2)

Regulatory frameworks need to be updated to incentivize innovation in the vaccine market

APAC

In China, the Ministry of Agriculture (MOA) is the national authority responsible for veterinary vaccines.

In 2011, the MOA introduced measures to strengthen the quality control of vaccines, standardize development of products and safeguard quality and safety.

« More information about vaccines approval in APAC »

Differences: US vs Europe

Compared to the US, the approval pathway in the EU is more prescriptive and restrictive. As a result, it generally takes more time and money to get a product launched in the EU than it does in the US.

« More information about vaccines approval »

Regulations for Vaccines Use

Protocols on vaccine administration need to be tailored to individual markets for maximum impact

Overall

Vaccine protocols for cats and dogs are primarily driven by guidelines provided by the country's veterinary sector association. Such guidelines are often country-specific, but carefully take into consideration guidance provided by renowned veterinary associations such as the World Small Animal Veterinary Association (WSAVA).

« More information about regulations for vaccines use »

US

The US have adopted a less restrictive approach on veterinary vaccine safety and regulations than in some other countries and regions, for example in Europe.

« More information about regulations for vaccines use in US »

Europe

In Europe, guidelines on current recommendations for vaccination of cats and dogs tend to be set at national level. For example, in the UK,

« More information about regulations for vaccines use in Europe »

APAC

As with the other aforementioned markets,

« More information about regulations for vaccines use in APAC »

Chapter 3: Market Overview

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Canine and Feline Population

[1] Since the publications of our Canine Oncology and Pet Pain reports (Q3 2021), the European dog and cat numbers have been updated using new historical 2020 data, resulting in a slight uplift in the forecasted numbers for EU-5.

Pet ownership will continue to increase with notable growth in EU-5 and APAC-3 markets

Overall

There has been an increase in the ownership of pets globally and this trend is expected to continue through to 2035. The combined canine & feline population will grow at a CAGR of **X%** from 2020 until 2035. The Covid-19 pandemic accelerated adoption of pets which is reflected in our forecast.

« More information about canine and feline population »

Dog Population

The global dog population will grow with a CAGR of **X%** from 2020 until 2035.

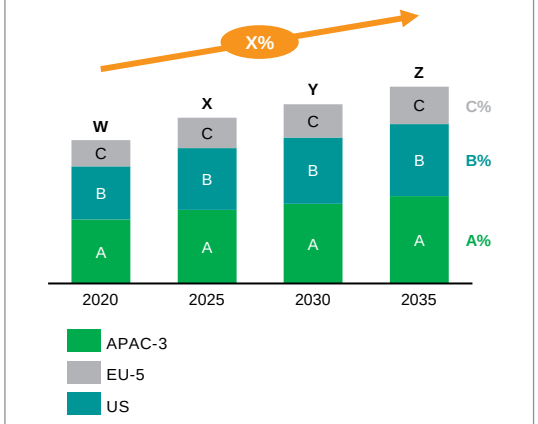
« More information about canine and feline population »

Cat Population

The global cat population will grow with a CAGR of **X%** from 2020 until 2035.

« More information about canine and feline population »

Canine and feline population (m)



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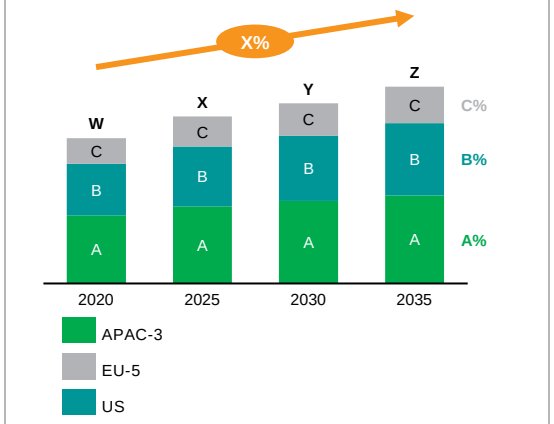
Canine population (m)



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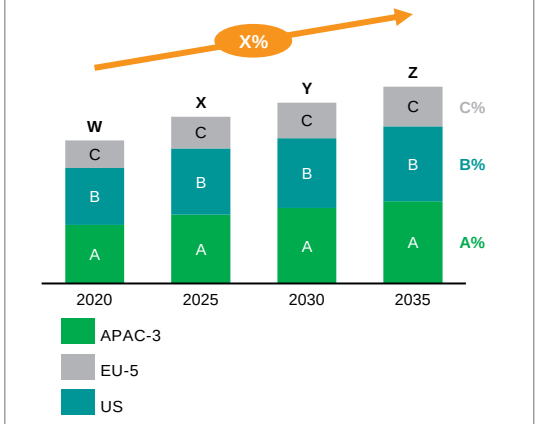
Feline population (m)



Source: Stonehaven Consulting © 2022 IHS Markit

Canine and Feline Health Market

Burgeoning sector with numerous growth opportunities in both developed and developing markets

Overall

The global companion animal health market is forecasted to grow at a CAGR of **+X%** from 2020 to 2035. The current core product segments of this sector are pharmaceuticals, biologics and parasiticides.

« More information about canine and feline health market »

Market Drivers

Growth in the pet health segment will continue to be driven by:

- An increasing global pet population;

« More information about canine and feline health market drivers »

« More information about canine and feline health market drivers »

Market Barriers

Over the past decade, pet care costs have increased steadily. According to a 2019 AVMA survey, the average veterinary expenditure per visit increased from $XXX in 2001 to $XXX in 2016.

« More information about canine and feline health market barriers »

Canine and Feline Vaccines Market (1/4)

Established sector but tech advancements and sociocultural changes will spur next growth wave

Canine and feline vaccines market ($m)

Source: Stonehaven Consulting

Overall

In 2020, dogs accounted for the largest segment of the vaccines market with **X%** share. This segment is projected to reach **$X billion** by 2035 from **$X billion** in 2020, representing a CAGR of +X%.

« More information about canine and feline vaccine market »

The existing approved canine- and feline-specific vaccines in the US and Europe have market dominance.

« More information about canine and feline vaccine market »

With rising levels of disposable income, people are expected to spend more on their pets.

« More information about canine and feline health market drivers »

Market Drivers

The increasing population of cats and dogs will be the main driver of growth of the vaccine market.

« More information about canine and feline health market drivers »

Market Barriers

Regulatory bodies such as the USDA in the US and the EMA in Europe have different standards for the approval of novel companion animal vaccines.

Canine and Feline Vaccines Market (2/4)

Established sector but tech advancements and sociocultural changes will spur next growth wave

« More information about canine and feline health market barriers »

« More information about canine and feline health market opportunities »

« More information about canine and feline health market opportunities »

Market Opportunities

Ecological processes such as climate change, urban encroachment and increased mobility will impact the epidemiology and evolution of pathogens. Emerging zoonotic diseases are already being seen and are growing in number and distribution. New vaccines will be needed to protect against these pathogens.

Canine and Feline Vaccines Market (3/4)

Established sector but tech advancements and sociocultural changes will spur next growth wave

Market Challenges

The COVID-19 pandemic has had an impact on the attitude towards vaccination in society. Although a small but growing of people are hesitant to vaccination, a large majority of the population has embraced the benefits of modern vaccines.

« More information about canine and feline health market challenges »

« More information about canine and feline health market challenges »

Canine Vaccines Market

Our modelling outputs show the dog vaccines market will grow with a CAGR of **+X%** from 2020 until 2035.

Core vaccines will increase by **X%** during this time period. By WSAVA category, this is the most lucrative market. Non-core vaccines will witness a **X%** upturn from 2020 to 2035.

Multivalent vaccines will increase by **X%** during this time period. By vaccine type, this is the most lucrative category by a very large margin. Monovalent vaccines will witness a **X%** upturn from 2020 to 2035, to occupy **X%** of the market by 2035.

Feline Vaccines Market

Our modelling outputs show the cat vaccines market will grow with a CAGR of **X%** from 2020 until 2035.

Core vaccines will increase by **X%** by 2034. WSAVA category, this is the most lucrative market. Non-core vaccines will witness an **X%** upturn from 2020 to 2035.

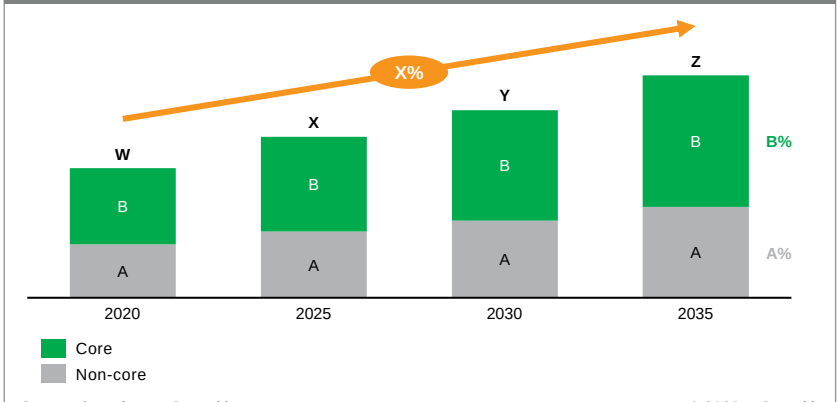
Multivalent vaccines will grow by **X%** during this time period and will take **X%** of the market share by 2035.

Monovalent vaccines will witness an **X%** upturn from 2020 to 2035, to occupy **X%** of the market by 2035.

Canine and Feline Vaccines Market (4/4)

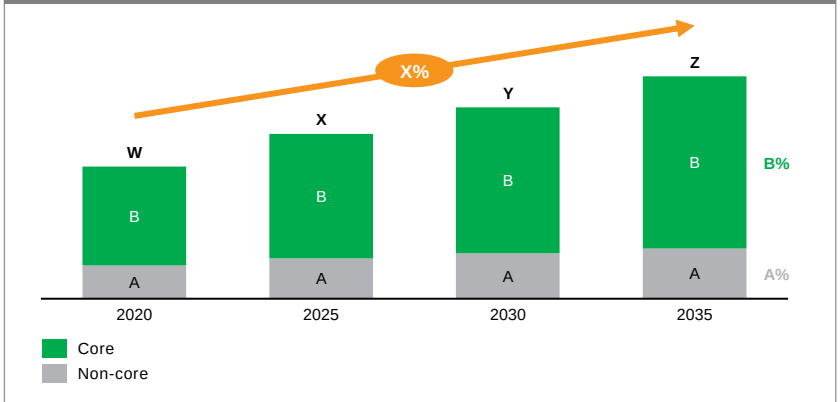
Established sector but tech advancements and sociocultural changes will spur next growth wave

Canine vaccines market by WSAVA category ($m)



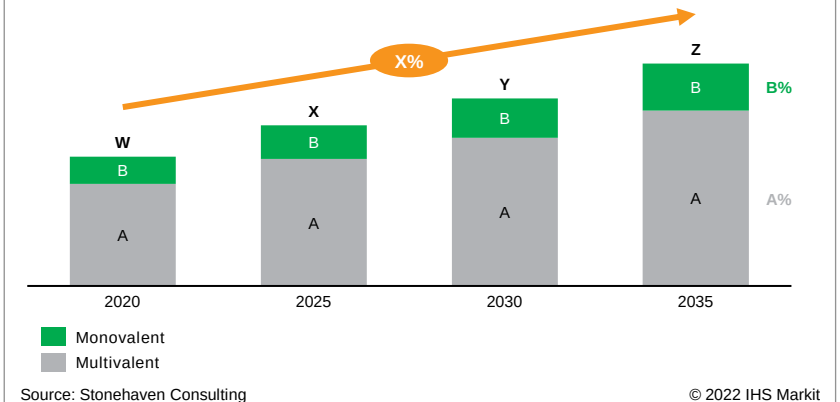
Source: Stonehaven Consulting

Feline vaccines market by WSAVA category ($m)



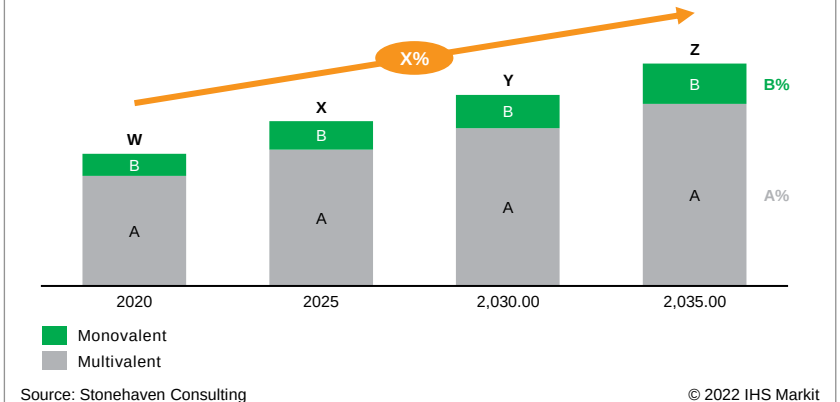
Source: Stonehaven Consulting

Canine vaccines market by composition ($m)



Source: Stonehaven Consulting

Feline vaccines market by composition ($m)



Source: Stonehaven Consulting

Chapter 4: Market Overview by Region

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Key Markets: Consolidated View

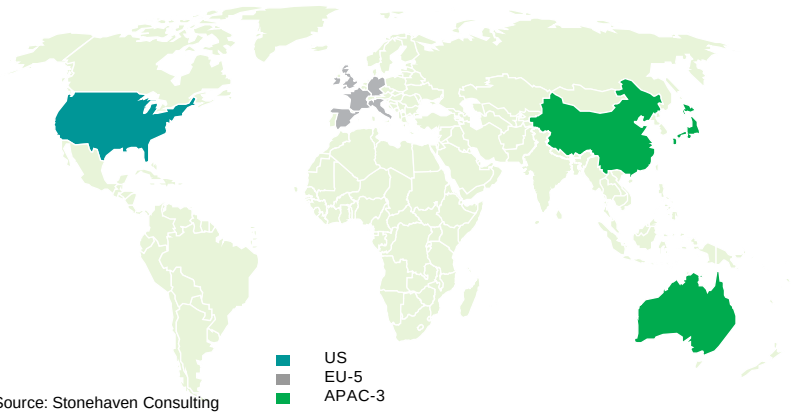
The US currently has the largest market segment while APAC-3 will experience the fastest growth

Overview

The vaccines market is anticipated to grow fastest in APAC-3 with a CAGR of **X%** between 2020 and 2035, followed by the US with a CAGR of **X%** and then the EU-5 with CAGR of **X%**. The US is currently the largest market with **~X%** share.

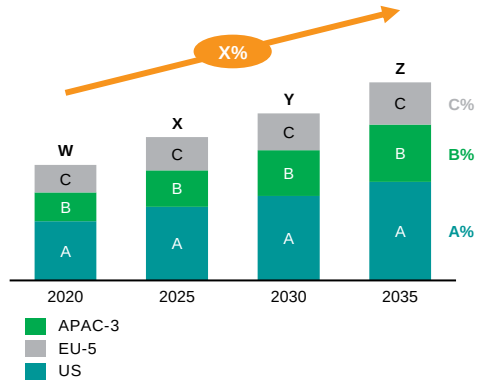
The 'core' vaccine market is expected to grow fastest with a CAGR of **X%** between 2020 and 2035, followed by 'non-core' with a CAGR of **X%**. The monovalent vaccine market is expected to grow fastest with a CAGR of **X%**, followed by the multivalent market, with a CAGR of **X%.**

« More information about key markets »



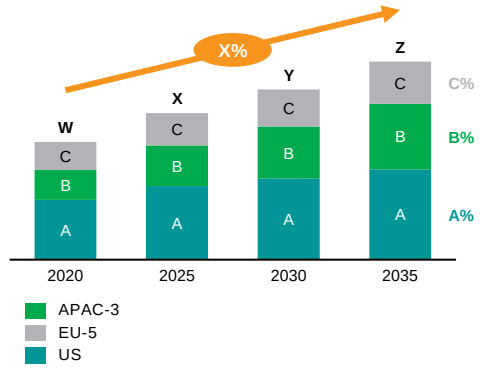
Source: Stonehaven Consulting

Canine vaccines market ($m)



Source: Stonehaven Consulting

Feline vaccines market ($m)



Source: Stonehaven Consulting

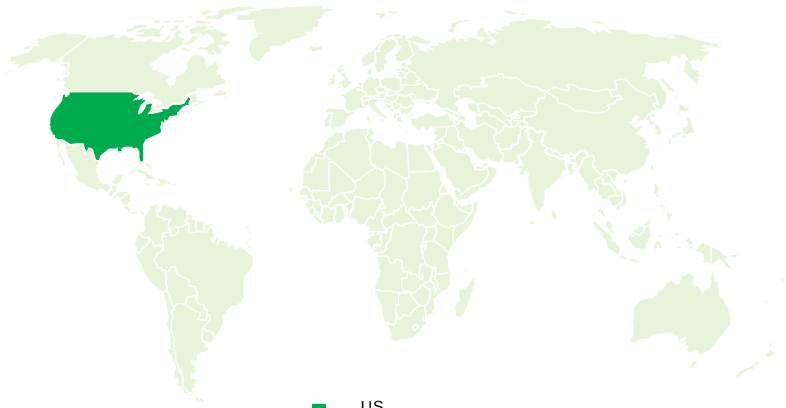
US Market

The US market will be driven largely by increasing pet population

Overview

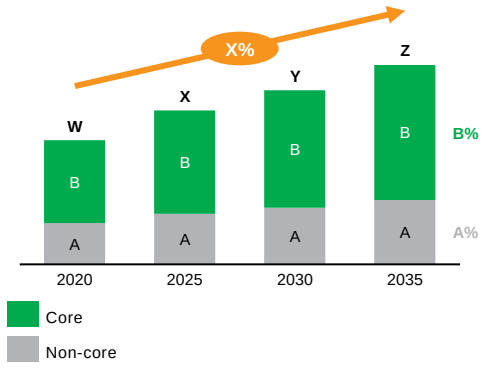
The US vaccines market is projected to reach **$X billion** by 2035 from **~$X billion** in 2020, representing a CAGR of **+X%**. This can be largely attributed to the following drivers.

« More information about US market »



Source: Stonehaven Consulting

Canine and feline vaccines market ($m)



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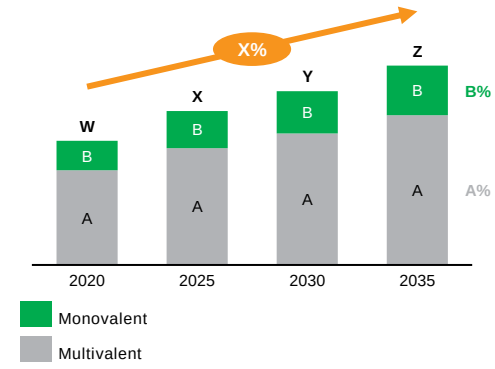
Canine and feline vaccines market ($m)



Source: Stonehaven Consulting © 2022 IHS Markit

EU-5 Market

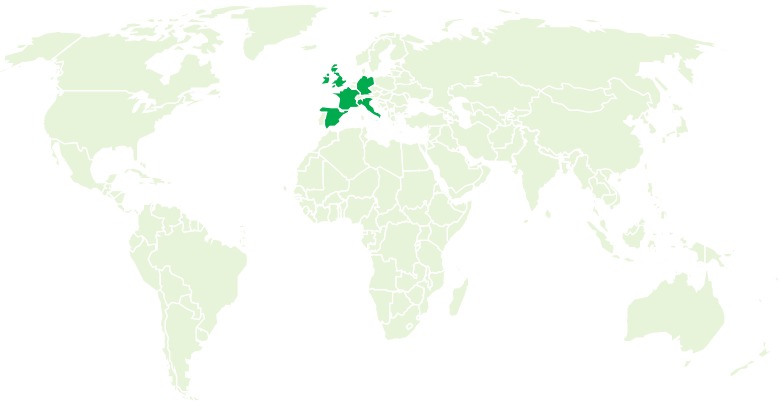
The EU-5 market will be driven largely by increasing pet population

Overview

The EU-5 vaccines market is projected to reach **$X billion** by 2035 from **$X billion** in 2020, representing a CAGR of **X%**. This can be largely attributed to the following drivers.

- Pet ownership continues to rise, and dog and cat populations are expected to grow substantially by 2035.

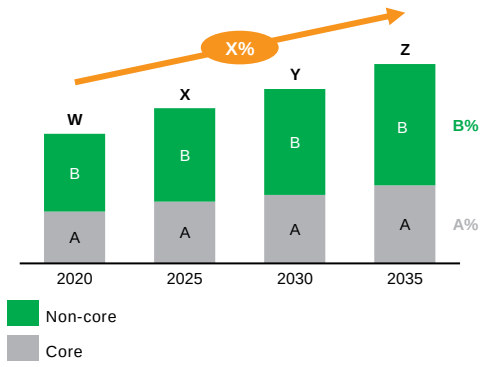
« More information about EU-5 market »



Source: Stonehaven Consulting

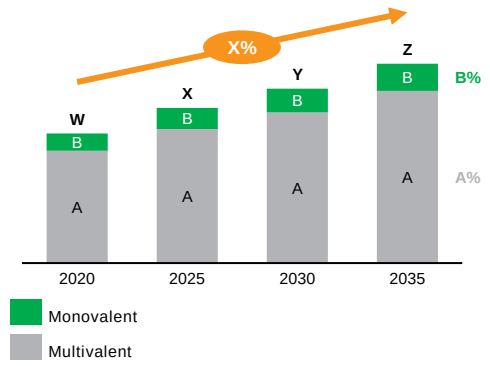
EU-5

Canine and feline vaccines market ($m)



Source: Stonehaven Consulting

Canine and feline vaccines market ($m)



Source: Stonehaven Consulting

APAC-3 Market

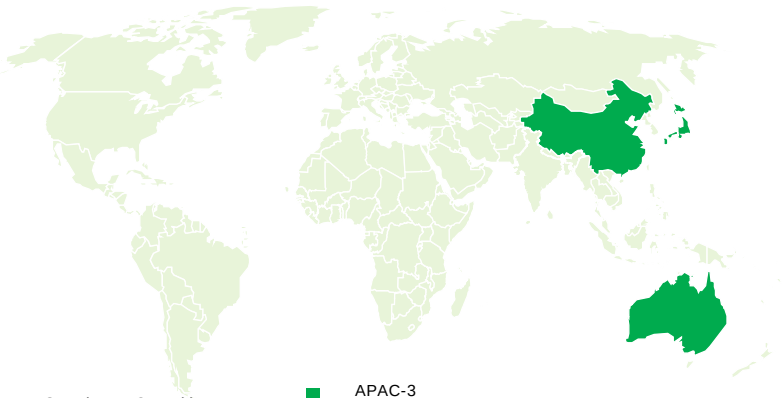
APAC-3 market will be driven largely by 'humanization' of pets and increasing disposable income

Overview

The APAC-3 vaccines market is projected to reach **$X billion** by 2035 from **$X billion** in 2020, representing a CAGR of **X%**. This can be largely attributed to the following drivers:

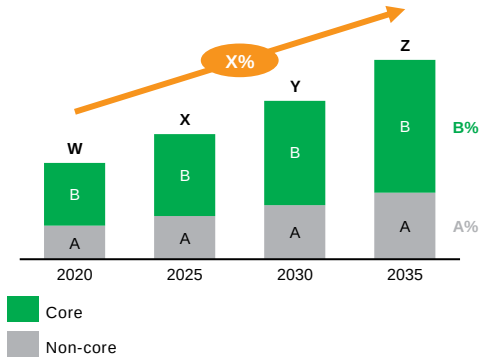
- Pet ownership continues to rise, and dog and cat populations are expected to grow substantially by 2035. In Japan, a CAGR of **X%** in cats and **X%** in dogs is expected between 2020 and 2035.

« More information about APAC-3 market »



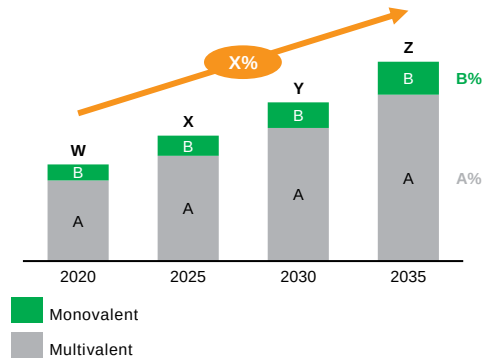
Source: Stonehaven Consulting

Canine and feline vaccines market ($m)



Source: Stonehaven Consulting © 2022 IHS Markit

Canine and feline vaccines market ($m)



Source: Stonehaven Consulting © 2022 IHS Markit

Chapter 5: Current Standard of Care

REPORT SAMPLE

Current Standard of Care in Dogs

Core vaccines comprise of WWW, XXX, YYY +/- ZZZ; non-core vaccines protocol is lifestyle-driven

Typical vaccination protocol for dogs at various stages in their lives

Core

Puppy

WWW + XXX + YYY +/- ZZZ*

Initial shot at 6-8 weeks of age. Then booster shots every 2-4 weeks until 16 weeks of age.

Adolescent

WWW + XXX + YYY +/- ZZZ*

A booster at 26 or 52 weeks of age, depending on serological status and risk of exposure

Adult

WWW + XXX + YYY +/- ZZZ*

Boosters every three years (for products with a three-year duration of immunity label; otherwise, annual boosters)

Non-core

Do I socialize or go into kennels?	Do I like to swim regularly?	Do I like to hike regularly?	Do I travel across borders?
XXX +/- YYY +/- ZZZ	XXX	YYY	XXX +/- YYY
Puppy: 1~2 shots Adult: Annual	Puppy: Two shots Adult: Annual	Puppy: Two shots Adult: Annual	Puppy: 1~2 shots Adult: Annual

Comments

- Core vaccines are typically comprised of XXX, YYY and ZZZ.
- XXX vaccination are mandatory in some countries (e.g., US and Japan) and for international pet travel
- Kennel cough (KC) vaccines (XXX) are increasingly likely to be offered in combination with XXX
- It is likely the core vaccines market will split into two:
  1) XXX
  2) YYY
- XXX vaccines are only available in the US
- XXX vaccines are deemed to be non-core, although ~80% are delivered together with the multivalent core vaccines
- XXX vaccines are offered in certain endemic countries

Current Standard of Care in Cats

Core vaccines comprise of WWW, XXX, YYY +/- ZZZ; non-core vaccines protocol is lifestyle-driven

Typical vaccination protocol for cats at various stages in their lives

Core

Kitten

WWW + XXX + YYY +/- ZZZ*

Initial shot at 6-8 weeks of age. Then booster shots every 2-4 weeks until 16 weeks of age.

Adolescent

WWW + XXX + YYY +/- ZZZ*

A booster at 26 or 52 weeks of age, depending on serological status and risk of exposure

Adult

WWW + XXX + YYY +/- ZZZ*

Boosters every three years (for products with a three-year duration of immunity label; otherwise, annual boosters)

Non-core

Do I go outdoors regularly?

XXX +/- YYY

Kitten: Two shots
Adult: Annual

Do I travel across borders?

XXX

Kitten: 1~2 shots
Adult: Annual

Comments

- Core vaccines are typically comprised of XXX, YYY and ZZZ.
- Immunity for XXX and YYY is only partial, and boosters more frequently than every three years is recommended for cats that are at higher risk of exposure
- XXX vaccination are mandatory in some countries (e.g., US and Japan), and for international pet travel
- XXX is regarded as a non-core vaccine, and recommended for cats that have an outdoor lifestyle
- XXX is currently not recommended by the WSAVA based on various reasons including questions over efficacy

Selection of Established Products for Dogs

Non-exhaustive list of typical vaccines given to dogs

Composition	WSAVA Category	Pathogen Target Example	Manufacturer Example	Brand Example
Multivalent	Core	Pathogen 1, 2, 3, 4	Company X	Brand Y
		Pathogen 1, 2, 3, 4	Company X	Brand Y
		Pathogen 1, 2, 3	Company X	Brand Y
	Non-core	Pathogen 1, 2	Company X	Brand Y
Monovalent		Pathogen 1	Company X	Brand Y
		Pathogen 1	Company X	Brand Y
		Pathogen 1	Company X	Brand Y
	Core	Pathogen 1	Company X	Brand Y
	Core/Non-core	Pathogen 1	Company X	Brand Y

Categorizations are dependent on the country; SPC conditions apply; please refer to country datasheet

Selection of Established Products for Cats

Non-exhaustive list of typical vaccines given to cats

Composition	WSAVA Category	Pathogen Target Example	Manufacturer Example	Brand Example
Multivalent	Core	Pathogen 1, 2, 3, 4	Company X	Brand Y
		Pathogen 1, 2, 3, 4	Company X	Brand Y
		Pathogen 1, 2, 3	Company X	Brand Y
		Pathogen 1, 2	Company X	Brand Y
Monovalent	Non-core	Pathogen 1	Company X	Brand Y
		Pathogen 1	Company X	Brand Y
		Pathogen 1	Company X	Brand Y
		Pathogen 1	Company X	Brand Y
	Core/Non-core	Pathogen 1	Company X	Brand Y

Categorizations are dependent on the country; SPC conditions apply; please refer to country datasheet

Selection of Recently Approved Products

Non-exhaustive list of recently approved vaccines

Technology	Additional comments	Pathogen Target Example	Manufacturer Example	Brand Example
Technology 1	Sub-unit protein	Pathogen	Company X	Brand Y
	Chimeric Protein	Pathogen	Company X	Brand Y
Technology 2	Bacterial plasmid DNA	Pathogen	Company X	Brand Y
Technology 3	Viral vector (canarypox)	Pathogen	Company X	Brand Y
	Viral vector (canarypox)	Pathogen	Company X	Brand Y
Technology 4	Viral vector (canarypox)	Pathogen	Company X	Brand Y
Technology 5	Oral administration	Pathogen	Company X	Brand Y
Technology 6	Recombinant protein	Pathogen	Company X	Brand Y
Technology 7		Pathogen	Company X	Brand Y
Technology 8	Chimeric Protein; not inhibited by MDA	Pathogen	Company X	Brand Y

Categorizations are dependent on the country; SPC conditions apply; please refer to country datasheet

[1] Full approval in the US, but marketing authorization application withdrawn in the EU because additional R&D required to answer remaining questions were not justified. There is not much data but it is the only product on the market to protect against metastasis.

Unmet Needs (1/2)

Players that can address unmet needs can disrupt the existing market and grow it by 2-3 multiples

Overview

This report focuses on the market size forecast of conventional vaccines that are based on long-established technologies such as live attenuated vaccines or inactivated/killed vaccines.

« More information on unmet needs »

Top factors influencing pet owner decisions

- Cost of vaccination including consultation fees

« More information on top factors influencing pet owner decisions »

Other factors influencing pet owner decisions

- Efficacy data (and quality of data demonstrating this efficacy)

« More information on other factors influencing pet owner decisions »

Unmet Needs (2/2)

[1] Others include Borrelia, Leishmania, Coronavirus and Ringworm (Dermatophytes of the Genera Trichophyton and Microsporum)

Players that can address unmet needs can disrupt the existing market and grow it by 2-3 multiples

'Unmet needs matrix' based on currently available canine and feline vaccines

Disease Target	1. QoL	2. Cost	3. Efficacy	4. Convenience	5. Compliance
Disease type 1					
Disease type 2					
Disease type 3					
Disease type 4					xxx
Disease type 5					
Disease type 6					
Disease type 7					xxx
Disease type 8					xxx
Disease type 9					
Disease type 10					
Disease type 11					
Disease type 12					
Disease type 13					
Disease type 14					
Disease type 15					
Others[1]					

Satisfactory for majority of patients
Satisfactory for ~50% of patients
Satisfactory for minority of patients

Source: Stonehaven Consulting

Definition of factors in unmet need matrix

1. **Quality of Life (QoL):** xxx
2. **Cost:** xxx
3. **Efficacy:** xxx
4. **Convenience:** xxx
5. **Compliance:** xxx

Chapter 6: Competition and Innovation

REPORT SAMPLE

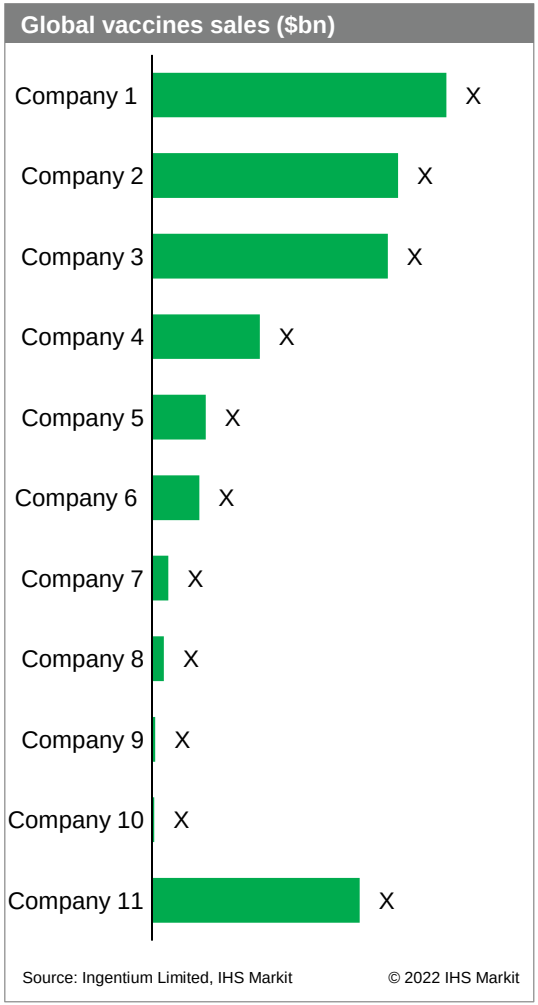
Competitive Landscape (1/2)

The vaccine market is highly consolidated with Merck, Boehringer and Zoetis leading the way

Vaccines Market

Merck Animal Health, Boehringer Ingelheim Animal Health and Zoetis stand out as the market leaders for veterinary vaccines – across all species – in terms of revenues and number of vaccines available on the market.

« More information on competitive landscape »



Competitive Landscape (2/2)

[1] Others include Borrelia, Leishmania, Coronavirus and Ringworm (Dermatophytes of the Genera Trichophyton and Microsporum)

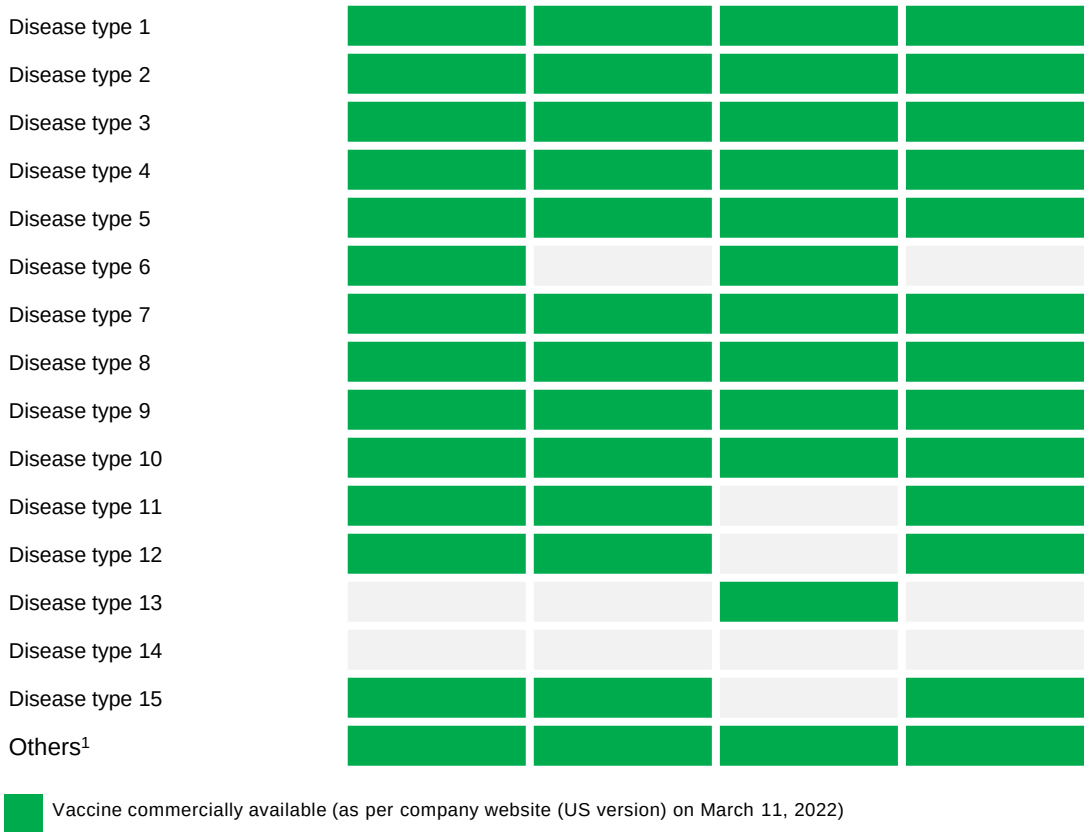
The companion animal vaccine market is even more concentrated with ~XX% held by the top three players

Vaccines Market: Companion Animals

The companion animal vaccines market is highly competitive, consolidated and commoditized.

« More information on competitive landscape »

Pathogen targets covered by the top four animal health players in the US



Source: Stonehaven Consulting

Top Animal Health Players and their Portfolios (1/2)

Every top player is active in the vaccines market and has a relatively exhaustive portfolio

Merck Animal Health

Merck is a public US-based company operating in both the human and animal health sectors. Historically, Merck grew in the vaccines space organically and is seen as a leading innovator in the veterinary vaccines space.

« More information about Merck Animal Health »

Boehringer Ingelheim Animal Health

Boehringer Ingelheim is a family-owned German company operating in both the human and animal health sectors. Boehringer grew in the vaccines space by acquiring Merial.

« More information about Boehringer Ingelheim Animal Health »

Zoetis

Zoetis is a public, US-based company operating solely in the animal health sector. It is the market leader in Animal Health with sales of $7.8 billion in 2021.

« More information about Zoetis »

Top Animal Health Players and their Portfolios (2/2)

Every top player is active in the vaccines market and has a relatively exhaustive portfolio

Elanco

Elanco is a public, US-based company operating solely in the animal health sector. In 2016, Elanco bought Boehringer's portfolio of canine, feline and rabies vaccines.

« More information about Elanco »

« More information about other players »

« More information about other players »

Other players

The top four animal health firms dominate the core multivalent vaccines space, so smaller businesses generally compete in the vaccines space by focusing on more niche indications e.g., Filavie's Filavac vaccine against rabbit hemorrhagic disease (RHDV2).

Selection of Start-ups and their Product Pipelines

Vet vaccine start-ups are present but level of innovation lag behind vaccine startups in human health

Company	AH	HH	Current target(s)	Product Technology	Description
Company 1			Target X	Product Technology Y	*« More information about Company 1»*
Company 2			Target X	Product Technology Y	*« More information about Company 2»*
Company 3			Target X	Product Technology Y	*« More information about Company 3»*
Company 4			Target X	Product Technology Y	*« More information about Company 4»*
Company 5			Target X	Product Technology Y	*« More information about Company 5»*
Company 6			Target X	Product Technology Y	*« More information about Company 6»*
Company 7			Target X	Product Technology Y	*« More information about Company 7»*
Company 8			Target X	Product Technology Y	*« More information about Company 8»*
Company 9			Target X	Product Technology Y	*« More information about Company 9»*
Company 10			Target X	Product Technology Y	*« More information about Company 10»*

AH: Focused on Animal Health; **HH:** Focused on Human Health

Innovation and Next-generation Vaccines (1/2)

Next-generation vaccines will come from close collaboration between animal health and human pharma

Overview

Innovation in companion animal vaccines is mostly driven by the top four animal health players. Compared to that of human health, innovation in vaccines for animals is lagging, and is even more acutely problematic on the companion animal segment. As such, the large animal health businesses compete on almost identical products.

« More information on innovation and next-generation vaccines »

« More information on innovation and next-generation vaccines »

« More information on incremental innovations »

Incremental innovations

Improvements in manufacturing

These innovations will not necessarily lead to better outcomes for vets and pet owners; the benefits are mainly absorbed by the animal health companies themselves (improvements in profitability and security).

« More information on incremental innovations »

Improvements in delivery/administration

- Technologies centred on single dose immunisation and longer duration of immunity to improve compliance and coverage

« More information on improvements in delivery/administration »

Innovation and Next-generation Vaccines (2/2)

Next-generation vaccines will come from close collaboration between animal health and human pharma

Breakthrough innovations

New disease targets

- Therapeutic vaccines will offer lower cost and longer duration of immunity alternatives to monoclonal antibodies, of which we have seen an explosion on the human health market in recent years

« More information on new disease targets »

« More information on new disease targets »

Novel vaccine technologies

- The first DNA vaccine was developed in animal health (Elanco's Clynav vaccine to protect Atlantic salmon against pancreas disease).

« More information on novel vaccine technologies »

Innovation in ancillary markets:

Diagnostics

- There have been advances in the availability of rapid, point-of-care (POC) serological testing kits that can detect the presence of antibodies

« More information on diagnostics »

Chapter 7: Definition and Methodology

Core and Non-core Vaccines

Definition and classification of vaccines and pathogens

Definition of vaccine

Vaccines contain components that are designed to elicit an immune response in an animal. Vaccines may comprise of four parts. These are:

1. **Antigen** is the immunologically… *« More information about antigen »*
2. **Vehicle** is the physical formulation that… *« More information about vehicle »*
3. **Adjuvant** gives a boost to the immune system… *« More information about adjuvant »*); and
4. **Stabilizers** protect the antigen …*« More information about stabilizers ».*

Vaccine manufacturers provide recommendations for how many doses are required for the optimal immune response.

« More information on definition of vaccine»

Definition of pathogen

Pathogens are microorganisms that cause diseases in animals. Vaccines are designed to provide immunity against pathogens. Viruses, bacteria, fungi and parasites can act as pathogens.

- **Established pathogens** are endemic and… *« More information about established pathogens »*
- **Emerging pathogens** are those that are becoming more prevalent… *« More information about emerging pathogens »*
- **Emerging variants** lead to vaccines antigens *« More information about emerging variants »*

Zoonotic transfer is the transmission of a pathogen from animals to humans.

Categorizing vaccines by need

The World Small Animal Veterinary Association (WSAVA) issues vaccination guidelines for veterinary practitioners. For dogs and cats, vaccines are defined as either ‘core’ or ‘non-core’.

« More information on categories of vaccines by need »

« More information on categories of vaccines by need »

Categorizing vaccines by composition

Vaccines display parts of pathogens to the immune system. These are called antigens. Vaccines are classified according to which antigens they display.

- *« More information on categories of vaccines by composition »*

Conventional and Innovative Vaccines

Definition and classification of vaccines and pathogens

Conventional vaccines

For the purpose of market modelling, we have defined conventional vaccines as those that use well established technologies. As such, these types of vaccines have been commercialized for a long time.

- **Killed** vaccines utilize killed pathogens, where the bacterium… *« More information on killed vaccines»*
- **Live attenuated** vaccines use 'weakened' but 'alive' pathogens. *« More information on live attenuated vaccines »*
- **Toxoid** *« Information on toxoid vaccines »*
- **Subunit** vaccines employ purified fragments of a…*« More information on subunit vaccines »*

Companion animal vaccines are usually given as subcutaneous injections, although nasal sprays are available for certain preparations.

Innovative vaccines

For the purpose of market modelling, we have defined innovative vaccines as those that utilize new technologies to trigger an immune response. Such technologies include:

- **Recombinant protein** vaccines are made by inserting genetic material of the target organism into the DNA of a… *« More information on recombinant protein »*
- **Viral vector** vaccines are vaccines that use 'safe' viral vectors (e.g., adenoviruses) to *« More information on viral vector vaccines »*
- **DNA** vaccines are made by transfecting genetic material of the target organism into the cells of the host. *« More information on DNA vaccines »*
- **mRNA** vaccines operate using a similar principle to DNA vaccines. The difference is that,… *« More information on mRNA vaccines »*
- **T cell** vaccines use antigens that are specific to T cells. *« More information on T cell vaccines »*
- **Experimental technologies** currently in development include antigen-presenting cell (APC) vaccines *« More information on APC vaccines »*

Innovation can also center on new methods to improve convenience levels. New methods include:

- **Oral** vaccines: given via the mouth
- **Hydrogel** vaccines: applied on the skin

Increasing the **Duration of Immunity (DOI)** is also an objective of vaccine innovation. *« More information on DOI »*

Finally, companies are attempting to **increase manufacturing efficiency** of vaccines. This is based on:

- Increasing economy of scale;
- Automation of quality control;
- Procurement and material management efficiency changes; and
- Improving global forecast accuracy (outside the US in particular).

Established Pathogen Targets in Dogs (1/3)

Definition and characterizations of established vaccine targets of canine infectious diseases

Canine Distemper Virus (CDV)

- CDV is a highly contagious and particularly severe viral infection of dogs and other carnivores.

« More information on canine cistemper virus»

Canine Parvovirus (CPV)

- CPV is a highly contagious disease that can be fatal to dogs. Two predominant clinical syndromes are recognized:

« More information on canine parvovirus »

Canine Adenovirus (CAV)

- CAV-1 (hepatitis) and CAV-2 (respiratory disease) are associated with diseases in dog and other carnivores

« More information on canine adenovirus »

Vaccines available

- Most commonly available products are live attenuated vaccines.

« More information on vaccine availability »

Vaccines available

- All CPV vaccines currently authorised are live attenuated vaccines and are frequently included with other antigens, in multivalent vaccines.

« More information on vaccine availability »

Vaccines available

- All CAV vaccines utilize live attenuated virus and are frequently formulated with other virus antigens.

« More information on vaccine availability »

Established Pathogen Targets in Dogs (2/3)

Definition and characterizations of established vaccine targets of canine infectious diseases

Canine Parainfluenza Virus (CPi)

- This virus is another of the infectious agents considered to be part of the group of organisms associated with the kennel cough syndrome

« More information on canine parainfluenza virus »

Vaccines available

- Modified live virus vaccines are available

« More information on vaccine availability »

Bordetella Bronchiseptica (Bb)

- This is a bacterial, rather than viral, canine respiratory disease

« More information on bordetella bronchiseptica »

Vaccines available

« Information on vaccine availability »

Leptospira

- Leptospira is a serious bacterial infection of world-wide significance and is known to affect several species of mammal, including humans.

« More information on leptospira »

Vaccines available

« Information on vaccine availability »

Established Pathogen Targets in Dogs (3/3)

Definition and characterizations of established vaccine targets of canine infectious diseases

Rabies Virus

- Rabies is a viral infection of the nervous system that mainly affects carnivores and bats, although it can affect any mammal

« More information on rabies virus »

Vaccines available

- Live attenuated vaccines and killed inactivated vaccines are available

« More information on vaccine availability »

Borrelia

- Lyme disease, which is caused by *Borrelia burgdorferi* bacteria and transmitted through the bite of a tick, affects domestic animals (dogs, horses and possibly cats) and humans

« More information on borrelia »

Vaccines available

- Vaccine products are recombinant subunits that target OSP A and C.

« More information on vaccine availability »

Canine Herpes Virus

- Puppies acquire the virus in the first few days following birth and infection results in serious illness and, in many cases, early neonatal death.

« More information on canine herpes virus »

Vaccines available

- A purified sub-unit vaccine, containing glycoproteins of canine herpes virus adjuvanted in mineral oil, is available for the active immunisation of bitches to prevent mortality.

« More information on vaccine availability »

Established Pathogen Targets in Cats (1/3)

Definition and characterizations of established vaccine targets of feline infectious diseases

Feline Panleukopaenia Virus (FPV)

- Feline panleukopenia (also known as feline parvovirus (FPV)) is a highly contagious, often fatal, viral disease of cats that is seen worldwide. Kittens are affected most severely. Adult cats are much less often affected

« More information on FPV »

Feline Herpesvirus Type 1 (FHV1)

- Feline viral rhinotracheitis is marked by fever, frequent sneezing, inflamed eyes (conjunctivitis), inflammation of the lining of the nose (rhinitis) and often salivation.

« More information on (FHV1) »

Feline Calicivirus (FCV)

- FCV infection can cause acute oral and upper respiratory signs, but has also been associated with chronic gingivastomatitis, which may be immune-mediated

« More information on (FCV) »

Vaccines available

Inactivated (killed) and modified-live virus vaccines that provide solid, long-lasting immunity are available for prevention of feline panleukopenia.

« More information on vaccine availability »

- **Vaccines available**

« Information on vaccine availability »

Vaccines available

« Information on vaccine availability »

Established Pathogen Targets in Cats (2/3)

Definition and characterizations of established vaccine targets of feline infectious diseases

Feline Leukemia Virus (FeLV)

- Feline leukemia virus (FeLV) is one of the most common infectious causes of disease of cats globally

« More information on FeLV »

Feline Immunodeficiency Virus (FIV)

Feline immunodeficiency virus (FIV) is one of the most common and consequential infectious diseases of cats around the world.

« More information on FIV »

Chlamydia Felis

- Feline Chlamydophila is regarded as a primary conjunctival pathogen and infection always involves the eye,

« More information on Chlamydia Felis »

Vaccines available

« Information on vaccine availability »

Vaccines available

« Information on vaccine availability »

Vaccines available

« Information on vaccine availability »

Established Pathogen Targets in Cats (3/3)

Definition and characterizations of established vaccine targets of feline infectious diseases

Feline Infectious Peritonitis (FIP)

- Feline infectious peritonitis (FIP) is an immune-mediated disease triggered by infection with a feline coronavirus (FCoV)

« More information on FIP »

Vaccines available

« Information on vaccine availability »

Rabies Virus

- Rabies is a viral infection of the nervous system that mainly affects carnivores and bats, although it can affect any mammal

« More information on rabies virus »

Vaccines available

« Information on vaccine availability »

Structuring the Vaccine Market

A bottom-up method was used and validated with top-down data; data quality varied across markets

Canine and feline vaccine market structure in market model

Disease Target	Cat	Dog	Composition	WSAVA Cat.
Disease type 1				
Disease type 2				
Disease type 3				
Disease type 4				
Disease type 5				
Disease type 6				
Disease type 7				
Disease type 8				
Disease type 9				
Disease type 10				
Disease type 11				
Disease type 12				
Disease type 13				
Disease type 14				
Disease type 15				
Others[1]				

Source: Stonehaven Consulting

Overview

The vaccine market can be largely segmented by the way in which vaccines are composed (i.e., multivalent vaccine or monovalent vaccine) or categorized according to WSAVA guidelines (i.e., core vaccine or non-core vaccine).

« More information on vaccine market structure »

KEY:

By composition

- Predominantly available as multivalent vaccine format
- Available as both multivalent and monovalent vaccine formats
- Predominantly available as monovalent vaccine formats

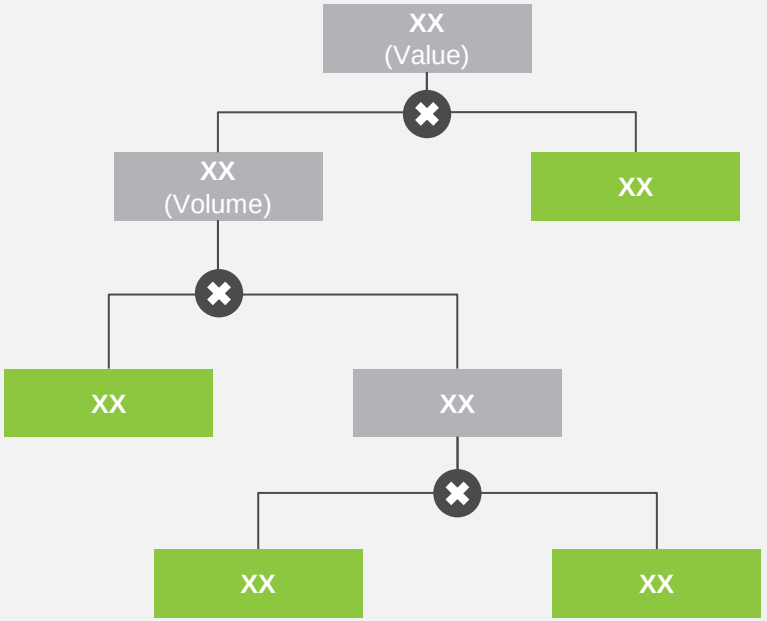
By WSAVA category

- Deemed a core vaccine in most key markets
- Likely to become a core vaccine in most key markets in the near future
- Deemed a non-core vaccine in most key markets

Market Sizing Methodology and Data Limitations

A bottom-up market modelling method was used; however, data was lacking in certain markets

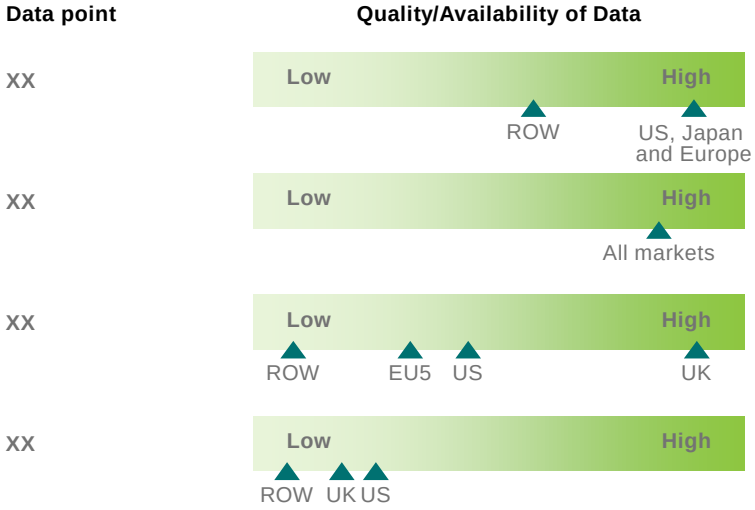
Market sizing methodology



Source: Stonehaven Consulting

Quality and availability of data

Data quality and availability issues: We encountered challenges in gathering certain data points from reputable sources. As such, where certain data were lacking, assumptions and proxy figures were adopted to size up the market. We have summarized below the quality and availability of key data points.



Our call to action: In preparation for future editions of the report, we want to explore the possibility of collaborating more closely with the wider animal health network (comprising manufacturers, research organizations and veterinary associations) to improve the quality and availability of vaccination data and help address other data gaps, with the ultimate aim of improving the accuracy of the market modelling outputs.

Source: Stonehaven Consulting

Market Sizing Assumptions for Dogs

The bottom-up market model uses a combination of demographic and economic projections

	Average vaccination compliance rate[1] (%)	Average companion animal demographics (%)	Number of doses per vaccine per year	Average ex-manufacturer price per vaccine dose ($)
Description	Triangulated from academic sources and Stonehaven Consulting estimates. Variations in estimates driven by species, country and WSAVA *core/ non-core* status.	Triangulated from academic sources and Stonehaven Consulting estimates. Variation in estimates driven by species. **Class 1:** Ages 0 to 1 **Class 2:** Ages above 1 to 8 **Class 3:** Ages above 8	Triangulated from expert input, academic sources and Stonehaven Consulting estimates. Variations in estimates driven by age class, vaccine type and specific product.	Triangulated from online Vx prescription websites and Stonehaven Consulting estimates. Ex-manufacturer price was computed by multiplying the retail price by X.X.
Overall	***Core*:** **XX%~YY%** ***Non-core*:** **XX%~YY%** **China:** X% CAGR **ROW:** X% CAGR **Compliance rate decrease index:** **Class 1: X.X** **Class 2: X.X** **Class 3: X.X**	**Class 1: X%** -2.41% CAGR **Class 2: X%** 0.21% CAGR **Class 3: X%** 0.56% CAGR	**Class 1:** ***Core*: X~Y** ***Non-core*: X** **Class 2:** ***Core*: X~Y** ***Non-core*: X** **Class 3:** ***Core*: X~Y** ***Non-core*: X**	**Multivalent *core*:** **X~Y** **Multivalent *non-core*:** **X~Y** **Monovalent *core*:** **X~Y** **Monovalent *non-core*:** **X~Y** **US:** X% CAGR **EU-5:** X~Y% CAGR **APAC-3:** X~Y% CAGR

Estimates in 2020 (estimates built from academic papers and expert interviews)
Change from 2020-2035 (CAGR). Probabilities of vaccine uptake were sourced from academic literature. Uptake probability is four times greater for multivalent than monovalent vaccines.
[1] Compliance rates for core and non-core vaccines refer to general compliance rates. Decrease index refers to compliance change per age class.

Market Sizing Assumptions for Cats

The bottom-up market model uses a combination of demographic and economic projections

	Average vaccination compliance rate[1] (%)	Average companion animal demographics (%)	Number of doses per vaccine per year	Average ex-manufacturer price per vaccine dose ($)
Description	Triangulated from academic sources and Stonehaven Consulting estimates. Variations in estimates driven by species, country and WSAVA *core/non-core* status.	Triangulated from academic sources and Stonehaven Consulting estimates. Variation in estimates driven by species. **Class 1:** Ages 0 to 1 **Class 2:** Ages above 1 to 8 **Class 3:** Ages above 8	Triangulated from expert input, academic sources and Stonehaven Consulting estimates. Variations in estimates driven by age class, vaccine type and specific product.	Triangulated from online Vx prescription websites and Stonehaven Consulting estimates. Ex-manufacturer price was computed by multiplying the retail price by X.X.
Overall	***Core*:** **X%~Y%** ***Non-core*: X%~Y%** **China:** X% CAGR **ROW:** Y% CAGR **Compliance rate decrease index:** **Class 1: X.X** **Class 2: X.X** **Class 3: X.X**	**Class 1: X%** -2.48% CAGR **Class 2: X%** 0.30% CAGR **Class 3: X%** 0.30% CAGR	**Class 1:** ***Core*: X~Y** ***Non-core*: X** **Class 2:** ***Core*: X~Y** ***Non-core*: X** **Class 3:** ***Core*: X~Y** ***Non-core*: X**	**Multivalent *core*:** **X~Y** **Multivalent *non-core*:** **NA** **Monovalent *core*:** **X~Y** **Monovalent *non-core*:** **X~Y** **US:** X% CAGR **EU-5:** X~Y% CAGR **APAC-3:** X~Y% CAGR

Estimates in 2020 (estimates built from academic papers and expert interviews)
Change from 2020-2035 (CAGR). Probabilities of vaccine uptake were sourced from academic literature. Uptake probability is four times greater for multivalent than monovalent vaccines.
[1] Compliance rates for core and non-core vaccines refer to general compliance rates. Decrease index refers to compliance change per age class.

Chapter 8: Report Authors, Expert Panel and Contributors

REPORT SAMPLE

Report Authors

Jai Bolton
PhD student
University of Oxford

Jai graduated with a First-Class degree in Biological Sciences from the University of Oxford in 2019. He is currently a PhD student at the University of Oxford. His research concerns the design of vaccines to bird and human flu and predicting pandemic-capable strains. During the coronavirus pandemic he worked on the Oxford-AstraZeneca COVID-19 vaccine clinical trials, tracked the outbreak through Scotland and tested novel therapeutics.

Jai is interested in business strategy and consultancy. He has acted as Team Coordinator in two university strategy challenges, working for external clients. He is completing an internship with Stonehaven Consulting AG.

Andre Knuchel-Takano
Senior Analyst
Stonehaven Consulting AG

Andre qualified as a veterinary surgeon from the Royal Veterinary College and later obtained an MSc in International Health Management from Imperial College London. As an analyst at Stonehaven Consulting AG, he worked on several strategy projects for animal health companies, human health companies and start-up clients, including the analysis of new vaccine platforms. He is also a fully qualified Chartered Management Accountant and previously worked at a FTSE 100 Human Pharma and Vaccines company, focusing on strategic finance and accounting across Consumer Healthcare, Respiratory Franchise and Japan Pharmaceuticals. He also has experience delivering disease burden forecasting projects in human public health.

Joseph Harvey
Head of Animal Health
IHS Markit

As head of animal health, Joseph provides news and analysis regarding the global animal health market across a range of species and products. He conducts exclusive interviews with the sector's biggest companies and experts, as well as start-up firms. He also hosts webinars and gives talks on the industry. Having gained many years of experience in business journalism, Joseph started writing about animal health in 2012. He previously built his experience by reporting on the human med-tech and diagnostics sector. Joseph is a well-known figure in the animal health sector through his articles, interviews, podcasts and webinars. His specialist areas include analysis of business trends, M&A, industry rankings, IPOs, company strategy and R&D.

Arthur Redpath
Senior Global Marketing Expert
Stonehaven Consulting AG

Arthur is a senior marketing executive with over 30 years of experience in the animal health, pharmaceuticals and agricultural industries, after graduating from Edinburgh University Royal Dick Veterinary College as a veterinary surgeon in 1987.

He joined Novartis Animal Health in 2000 where he progressed to global leadership roles. In 2015, he joined Elanco, where he assumed the leadership positions of EMEA Chief Marketing Officer and leader of the Global Marketing Excellence team.

Expert Panel

We consulted several world-leading experts in veterinary vaccines in the making of this report

Ian Thompson
Senior Advisor in Vaccines & Aqua

Ian received his PhD in immunology and nutrition from University of Aberdeen in Scotland.

He has spent over 20 years in the animal health industry with Novartis Animal Health and Elanco Animal Health and previously held a number of senior roles including leading Aqua R&D for Novartis Animal Health and Global Vaccines R&D for Elanco Animal Health.

He now serves as an independent consultant with a broad client base including start ups, incubator and venture funds and veterinary pharmaceutical companies.

Ian also has a part-time role as CSO of Touchlight Aquaculture which aims to develop a new and improved generation of DNA vaccines.

Mike Huether
Senior Advisor in Vaccines & Biopharma

Mike received his MS and PhD in microbiology and molecular immunology from the University of Nebraska and Minnesota.

He spent more than 20 years as a senior global R&D executive with Zoetis, Pfizer and Solvay Animal Health. He led several organization in senior roles including Global Biological Development, Analytical Development and Manufacturing Technical Support. He has experience in delivering on new product development, acquisitions and final product transfers for global regulatory approval.

He now serves as an independent consultant for several animal and human health companies focusing on new vaccine and biopharmaceutical development.

René Aerts
Senior Advisor

René holds a PhD in Pharmaco-chemistry and Bioanalytics.

He has worked in senior roles in the animal health industry for more than 30 years, of which 23 years were with Intervet and Merck Animal Health. He was Head of Antibiotics Research, Global Head Regulatory Affairs, Head of Manufacturing Operations for The Netherlands and Executive Team member of Merck Animal Health responsible for global vaccine R&D.

More recently, he advises senior management of top tier animal health companies and venture capital/private equity partners on R&D and manufacturing strategy, as well as M&A projects.

René holds a number of non-executive positions in the field of animal health, human biotech and agtech.

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Chapter 9: Glossary and References

REPORT SAMPLE

Glossary

Glossary of key abbreviations used in the report

AAHA	American Animal Hospital Association
AH	Animal Health
AHI	Animal Health Institute
APAC	Asia Pacific
API	Active Pharmaceutical Ingredient
AVMA	American Veterinary Medical Association
Bb	Bordetella Bronchiseptica
BSAVA	British Small Animal Veterinary Association
BVA	British Veterinary Association
CAGR	Compound Annual Growth Rate
CAV	Canine Adenovirus
CDV	Canine Distemper Virus
Ch	Feline Chlamydia
CIV	Canine Influenza Virus
CPV	Canine Parvovirus
CVM	Center for Veterinary Medicine
CVB	Center for Veterinary Biologics
CVMP	Committee for Medical Products for Veterinary Use
DIVA	Differentiating Infected from Vaccinated Animals
DNA	Deoxyribonucleic Acid
DOI	Duration of Immunity
EMA	European Medicines Agency
FCV	Feline Calicivirus
FCoV	Feline Coronavirus
FeLV	Feline Leukemia Virus
FHV1	Feline Herpesvirus 1
FIP	Feline Infectious Peritonitis
FIV	Feline Immunodeficiency Virus
FPV	Feline Panleukopaenia Virus
GCP	Good Clinical Practice
GLP	Good Laboratory Practice
GMP	Good Manufacturing Practice
HH	Human Health
IABS	International Alliance of Biological Standardization
JMAFF	Japanese Ministry of Agriculture, Forestry and Fisheries
Lp	Leptospirosis
M&A	Mergers and Acquisitions
MOA	Ministry of Agriculture (China)
OIE	World Organization for Animal Health
Pi	Parainfluenza
QoL	Quality of Life
Rb	Rabies
RNA	Ribonucleic Acid
SPC	Summary of Product Characteristics
US	United States
US FDA	United States Food & Drug Administration
USDA	United States Department of Agriculture
VGG	Vaccination Guideline Group
VICH	International Cooperation on Harmonization of Technical Requirements for Registration of Veterinary Vaccines
VLP	Virus-like-particle
VMD	Veterinary Medicines Directorate
WSAVA	World Small Animal Veterinary Association

References

Main sources used in the report

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