

## ZTS, KIN: Deep Dive in Pet Therapeutics Underscores New Drugs Likely to Drive Earnings Upside

SECTOR: Specialty Pharmaceuticals

May 27, 2014

**Please join us on June 23rd for our Animal Health Day in NYC.** There have been many development stage Animal Health companies focused on Companion Animals (pets). The number increased with the successful IPOs of **KIN** and **PETX**. Since larger Animal Health companies have not disclosed much on their pipelines, investors have asked us help to size and frame the opportunity for pet drugs. Therefore, we have done a deep dive in key therapeutic areas Animal Health companies are focused on (oncology, pain, allergy and dermatology, gastrointestinal), and why these large opportunities support our **BUY** ratings for **ZTS** and **KIN**.

**Pets are living longer and they are receiving more medical care.** We estimate that, if every dog lived half a year longer, this would grow the Vet Care market by \$700MM a year in the U.S. Rising incomes in the Emerging Markets is also driving pet ownership.

**We estimate the U.S. pet Oncology market is \$5.7B with potential upside to this figure.** The incidence of cancer is rising among pets. There are no FDA approved lymphoma or sarcoma drugs, and there is a 90% relapse rate for generic human drugs. Also, it is lucrative for veterinarians to use these drugs. Finally, the go-to market is finite and quick to penetrate, with only 175 vet oncologists and 625 specialty centers in the U.S. (only 800 customers). Some companies estimate only 8 sales reps would be needed to support a drug.

**The pet Pain market is ~\$1B worldwide, based on our diligence.** Although this is sizable, there is still an unmet need for drugs with better tolerability and side effect profiles that can be used chronically (alternatives to NSAIDs). Given the side effects and monitoring needed for NSAIDs, ~50% of chronically ill dogs cannot be treated. Some dogs have a sensitivity to NSAIDs (renal, hepatic/GI, toxicity, death). Also, in the U.S., there are no veterinary NSAIDs approved for oral use in cats. KIN's CereKin is a promising alternative to NSAIDs, with U.S. peak sales potential of \$130MM.

**We estimate the pet Allergy market has peak sales potential of over \$3B, growing at a 5-year CAGR ('14E to '19E) of 5.1%.** There has been an increasing focus on atopic dermatitis. The standard of care is Atopica (cyclosporine), but it inhibits T-lymphocytes, which makes it a potent immunosuppressant. Although Atopica is effective, side effects include vomiting, diarrhea, and increased infections. According to ZTS, newly launched Apoquel has blockbuster potential and will represent \$47MM of sales by the end of '14. If approved, we estimate KIN's AtoKin has peak sales potential of \$90MM.

**We estimate the worldwide pet Gastrointestinal (GI) market has peak sales potential of \$870MM, growing at 5-year CAGR (2014 to 2019) of 4.5%.** Growth is being driven by the increasing lifespan of pets and many GI problems are lifelong conditions with no existing cure.

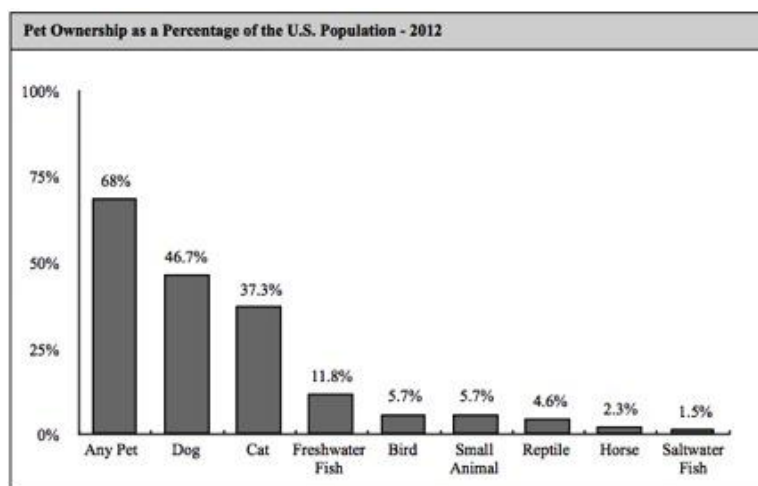
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## TABLE OF CONTENTS

<b>Sizing the Companion Animal Therapeutic Markets...</b>	<b>3</b>
<b>Oncology.....</b>	<b>7</b>
<b>Pain.....</b>	<b>9</b>
<b>Allergy and Dermatology.....</b>	<b>11</b>
<b>Veterinary Industry Conference and Meetings.....</b>	<b>14</b>
<b>Valuation Methodology and Risks.....</b>	<b>15</b>
<b>Companies Mentioned.....</b>	<b>16</b>

### SIZING THE COMPANION ANIMAL THERAPEUTIC MARKETS

According to the American Pet Products Association (“APPA”) 2013/2014 Pet Owners survey, 82.5MM (or 68% of) U.S. households own some type of pet. This is up by almost 10MM households from the 2011/2012 survey. The number of households owning dogs is now 56.7MM. The number of households owning cats is 45.3MM. More than 53% of pet owners have more than one pet. The total number of dogs rose to 83.3MM (from 78MM in 2011/2012) and cats to 95.6MM (86.4MM in 2011/2012). In the U.S. cats and dogs are the most popular pets, owned by 46.7% and 37.3% of U.S. households, respectively. The survey also noted that dog owners spend more than cat owners on common expenses.



Source: American Pet Products Association (APPA)

With the rise in pet ownership, the APPA estimates that spending on pets will increase to \$58.5B in 2014, up from \$55.7B in 2013. Vet care spending is estimated to be \$15.3B in 2014 (+4.4% YOY), with Pet Supplies/OTC Medicine spending expected to reach just under \$13.7B (+6.1% YOY). The figures include a retail mark-up, which we estimate can range from 45% to 50% for pet medicines. Therefore, the actual sales to animal drug makers will be lower. “Vet Care” expenditure includes: 1) veterinary therapeutics; 2) parasiticides and vaccines; and 3) other medical expenditures for routine veterinary visits. Over the counter (OTC) flea and tick products such as Frontline are included in the “Supplies/OTC Medicine” market, not “Vet Care. By our own estimates, we believe 33% of Vet Care spending relates to parasiticides and vaccines; 15% on pet therapeutics (excluding human drugs); and the remainder on other medical expenditures.

2014E U.S. Vet Care Sales		
(in billions of U.S. dollars)		
	Expenditure	%
Parasiticides and Vaccine	\$5.0	33%
Pet Therapeutics (not including Human Drugs)	\$2.3	15%
Other (vet visits and procedures)	\$7.9	52%
<b>Total Vet Care</b>	<b>\$15.3</b>	<b>100%</b>

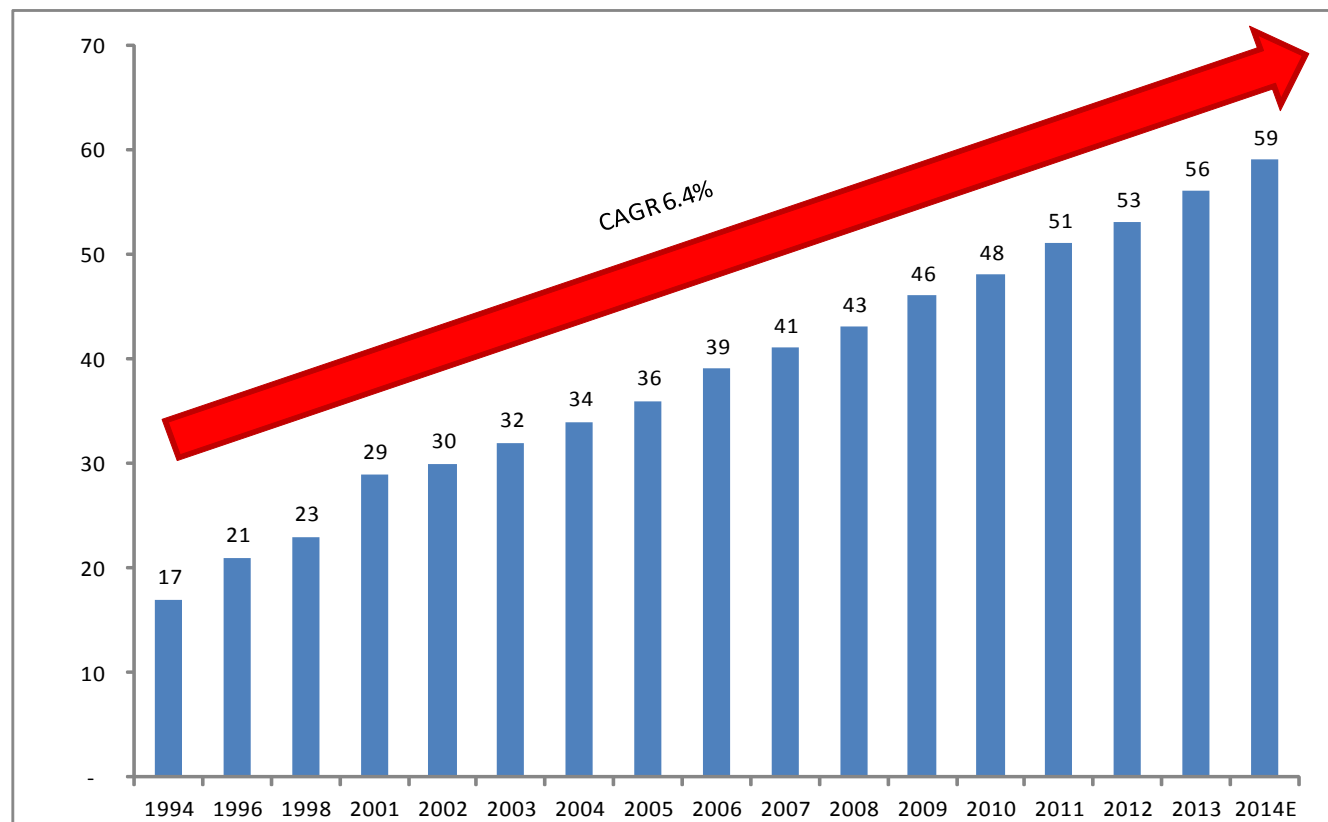
Source: Guggenheim Securities, LLC and American Pet Products Association (APPA).

U.S. Annual Pet Spending		
(in billions of U.S. dollars)		
	2014E	2013
Food	\$22.6	\$21.6
Supplies/OTC Medicine	\$13.7	\$13.1
Vet Care	\$15.3	\$14.4
Live animal purchases	\$2.2	\$2.2
Pet Services: grooming & boarding	\$4.7	\$4.4
<b>Total U.S. Spending on Pets</b>	<b>\$58.5</b>	<b>\$55.7</b>

Source: American Pet Products Association (APPA)

The U.S. pet industry has been robust, and the fastest growing segment is veterinary care expenditures. According to the APPA, U.S. consumers spent an estimated \$55.7B on their pets in 2013. This translates into an increase of 28.9% over 2008, and 71.4% over 2003 (5-year & 10-year CAGRs of 5.2% and 5.5%, respectively). U.S. veterinary care has been one of the fastest growing segments of the overall U.S. pet market, increasing from \$9.2B in 2006 to \$14.4B in 2013, an increase of 56.5% (CAGR of 6.4%).

**American Pet Products Association: U.S. Pet Industry Expenditure** (chart below in billions of U.S. dollars)



Source: American Pet Products Association (APPA),

Historically, large Animal Health companies have been more focused on livestock animals. In Companion Animal, the focus has been in overlapping sectors with livestock, notably vaccines, parasiticides, and anti-infectives, leaving a void of development in the areas of oncology, pain, dermatology, allergy, and gastrointestinal. As pets become an increasingly important part of families worldwide and live longer, there will be a growing need for Companion Animal drugs to treat these ailments. According to Vetnosis, the companion animal market makes up ~41% of the total animal health market. Vetnosis estimates that pharmaceuticals make up 62% of the animal health market, biologics 26%, and medicinal feed additives 12%.

We expect the conversion of \$1.5B of human drugs used off-label to treat pets to drugs designed specifically for animals to drive sales growth in the Companion Animal health market. We have often been asked how owners will pay for the pipeline of new animal health drugs coming to market in 2014+. One source of funds will be money currently spent on off label human drugs used to treat pets and the conversion of this spend to drugs designed specifically for pets. Based on our diligence, we estimate 20% of dog prescriptions and 30% of cat prescriptions are filled with off label human drugs.

The American Veterinary Medical Foundation estimates there are 100,000 veterinarians in the U.S., of which 43,000 are in private practice focused exclusively on Companion Animals. We estimate a company would need 50 sales reps to target this market, so it is a good business model for a start-up company and can reach profitability quickly. Companion Animal veterinarians are decision-makers and dispensers of medicines and vaccines for Companion Animals; as such, pet owners often purchase medicines and vaccines directly from veterinarians. Veterinarians purchase these medicines and vaccines from distributors. The top three national distributors fulfill approximately 70% of all U.S. pet sales by veterinarians. Each of these distributor organizations has a sales team of approximately 275 field sales representatives, 175 telesales representatives, and a dozen distribution centers geographically placed throughout the U.S..

According to an analysis by Vetnosis, the Companion Animal medicines and vaccines sector represented \$8.9B of sales in 2011, or 40% of the total animal health medicines and vaccines market. This sector grew at a CAGR of 6% between 2006 and 2011 and, excluding the impact of foreign exchange, Vetnosis expects the sector to grow at a CAGR of 5% per year between 2011 and 2016.

#### Factors driving demand for Companion Animal drugs include:

- Increases in disposable incomes, particularly in Emerging Markets
- Increasing pet ownership
- Companion Animals living longer
- Increasing treatment of Companion Animals
- Advances in Companion Animal drugs

Economic development in Emerging Markets could drive significant growth in pet ownership and spending in many of those markets. Pet ownership in Latin America (including Argentina, Brazil, Chile, Colombia, Mexico, and Venezuela) grew at a CAGR of 3% between 2007 and 2012, according to Euromonitor International data as of June 2012. Euromonitor estimates pet spending, including pet food and non-prescription pet products, grew at a CAGR of 14% in Latin America between 2007 and 2012.

According to the APPA, usage of medicines and vaccines among pet owners has increased. The APPA estimates that 78% of dog owners in the U.S. gave their dog(s) medications in 2010 as compared to 50% in 1998, and approximately 47% of cat owners in the U.S. treated their cat(s) with medications in 2010 as compared to 31% in 1998.

We believe the launch of new products will be the largest growth driver of companion animal drug sales. These new products will address: 1) large unmet need in the current market; 2) lack of product innovation; and 3) under-treated diseases in companion animals.

**We estimate that an increase in the average lifespan of a dog by half a year translates into \$700MM to annual Vet Care expenditure in the U.S.** According to the Banfield Pet Hospital "State of Pet Health 2013 Report," pets are living longer. The average lifespan of a cat in 2012 was 12 years (10% increase since 2002, adding a full year to its life). The average lifespan of a dog in 2012 was 11 years (4% increase since 2002, adding a half a year to its life). Older pets have more health issues. Therefore, less invasive and more cost effective pet drugs remain an unmet need.

#### Annual Vet Care Expenses

	Expenditure (\$MM)	% of Total Expenditures	Number of Dogs (MM)	Annual Spend Per Dog	Increase in Lifespan	Increase in Vet Care Spend Over a Dog's Life (MMs)	Average Dogs Lifespan 2012 (Years)	Potential Growth in Vet Care Spending Due to Increased Lifespan
Parasiticides and Vaccine	\$5,032.5	33.0%	83.3	\$60.4	0.5	\$2,516.3	11.0	\$228.8
Pet Therapeutics (not including Human Drugs)	\$2,287.5	15.0%	83.3	\$27.5	0.5	\$1,143.8	11.0	\$104.0
Other (vet visits and procedures)	\$7,930.0	52.0%	83.3	\$95.2	0.5	\$3,965.0	11.0	\$360.5
<b>Total Vet Care</b>	<b>\$15,250.0</b>	<b>100.0%</b>		<b>\$183.1</b>		<b>\$7,625.0</b>		<b>\$693.2</b>

Source: Guggenheim Securities, LLC and American Pet Products Association (APPA).

When looking at pure-play companion animal health companies such as PETX and KIN, both companies have pipeline products that focus on validated market opportunities — mainly pain (both post-surgical and osteoarthritis) and dermatology. That said, there still remains a large unmet need in these validated market opportunities, including anemia, allergy, skin disorders, chronic diseases for aging pets, and oncology, among others. Both KIN and PETX also see an opportunity to improve upon the safety and compliance of currently approved drugs. KIN has focused on pet versions of human drugs and biologics, whereas PETX has focused on small molecule pharmaceuticals and large molecule biologics for serious medical conditions in pets. Other companies such as NextVet, and VetDC are also developing drugs focused solely on Companion Animals.

Company	Companion Animal Focus	Key Drugs in Development
<b>Kindred</b>	Pet versions of successful human drugs and biologics, with a focus on human drugs used outside the U.S.	<b>CereKin</b> - for osteoarthritis <b>AtoKin</b> - high-dose antihistamine being developed for atopic dermatitis <b>SentiKin</b> - rapid-acting, non-NSAID, non-opioid analgesic being developed for post-operative pain
<b>Aratana</b>	Small molecule pharmaceuticals and biologics for serious medical conditions in pets	<b>AT-004</b> - B-cell lymphoma <b>AT-005</b> - T-cell Lymphoma <b>AT-001</b> - pain and inflammation associated with osteoarthritis <b>AT-002</b> - stimulation of appetite
<b>NextVet</b>	Monoclonal antibodies for pets	<b>NV-01</b> - chronic pain in dogs <b>NV-02</b> - treatment for chronic pain in cats <b>NV-06/NV-08</b> - treatment for inflammatory disease (especially of the skin) in dogs
<b>Vet DC</b>	Novel anti-cancer therapies for pets	<b>VDC-1101 (rabacfosadine)</b> - Canine and feline Lymphoma <b>VDC-597 (PI3k/MTOR inhibitor)</b> - various

Source: Company websites and filings

Beyond current validated market opportunities, there are many other disorders that remain under-treated in companion animals due to limited drug development and lack of awareness. These include canine cognitive disorder (Alzheimer's disease in dogs), lupus, and epilepsy among others. There are little to no FDA approved drugs for many such disorders. Therefore, there is opportunity for companion animal health companies to not only develop treatment but also create the market for these diseases.

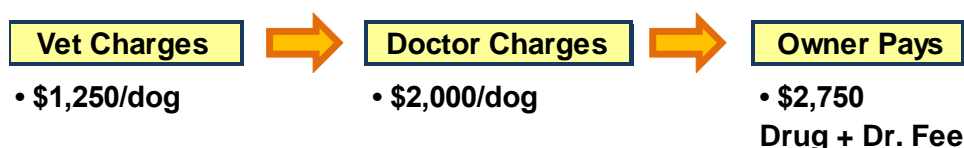
There are little to no biologics approved for veterinary use in the market to date. However, as manufacturing becomes less expensive (reduced COGs), we believe these drugs could be a large growth driver. We expect biologics to first impact validated market opportunities (such as the \$2B of oncology drugs used off-label in animals) and eventually expand into under-treated diseases in the market.

As the companion animal health market matures, we expect increased insurance coverage and improved access to veterinary care to grow the market.

## ONCOLOGY

**We estimate the U.S. pet Oncology market is potentially \$5.7B with large upside opportunities.** The majority of the treatments consists of generic, human chemotherapeutic agents. There are no FDA approved lymphoma or sarcoma drugs, and there is a 90% relapse rate for generic human drugs. Growth in this market will be driven by increased diagnosis and the willingness of veterinarians to use new treatments developed specifically for dogs or cats. Also, using pet oncology drugs is lucrative for veterinarians. Our chart below illustrates the economics to the veterinarian. Finally, the go-to market is finite and quick to penetrate, with only 175 vet oncologists and 625 specialty centers in the U.S. (only 800 customers). Some companies estimate only eight sales reps would be needed to support a drug. In the U.S, there are 5,000 veterinary hospitals treating cancer (out of a total 25,000 veterinary hospitals).

## Compelling Value Proposition



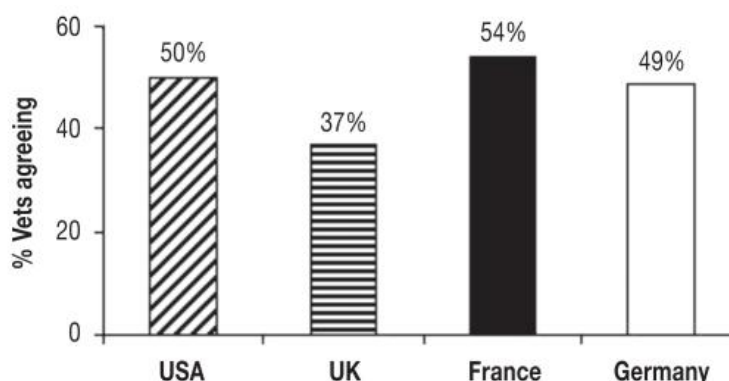
**Chemo (CHOP) = \$3,743**

**Single agent doxorubicin = \$2,100**

Source: Guggenheim Securities, LLC and VetDC Company Presentation

According to a study done by Vetnosis, a number of veterinarians agree that the prevalence of cancer in dogs is on the rise.

**Veterinarians who agreed with the statement “I am seeing cancer in dogs more and more frequently.”**



Source: Oncology Insight. Vetnosis, February, 2008.

Cancer is a major cause of morbidity and mortality in dogs, with approximately one in four dogs diagnosed with cancer at some point in their lives. The American Humane Society believes this number may go as high as one in two dogs that will get cancer in their lifetime. It is estimated that the prevalence of cancer in cats is one in six. The cost of current cancer treatments can vary by based on a number of factors including the severity and type of cancer affecting the animal. The most common cancer treatments are chemotherapy, radiation, and surgery. Chemotherapy can cost between \$6,000 and \$10,000 per course of treatment. Radiation can cost between \$5,000 and \$7,000 per course and surgery can cost between \$2,500 and \$7,000.



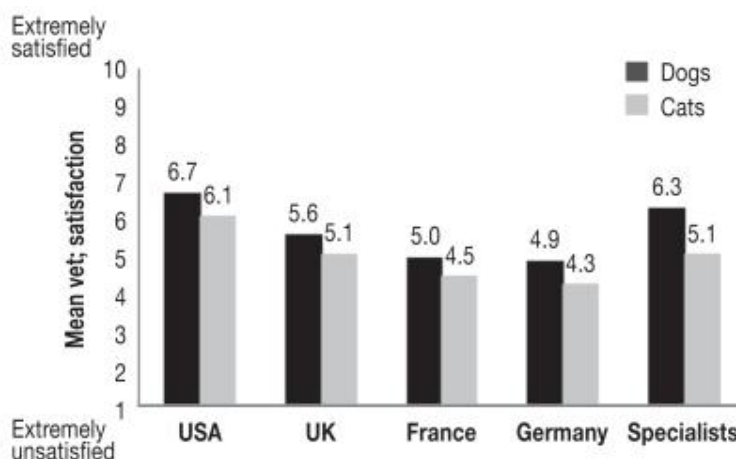
Species	Number of Dogs and Cats (MMs)	Prevalence of Cancer (1 in 4 for dogs and 1 in 6 for cats)	Average Lifespan (Years)	Number Diagnosed With Cancer in Their Lifetime (MM)	Estimated Drug Cost to Treat	Estimated Annual Spend on Cancer Treatment (MMs)
Dogs	83.3	25.0%	11.0	20.8	\$2,500.0	\$4,733.0
Cats	95.6	16.7%	12.0	15.9	\$750.0	\$995.8
<b>Total Estimated Cancer Market</b>						<b>\$5,728.8</b>

Source: Guggenheim Securities, LLC, Banfield Pet Hospital and American Pet Products Association (APPA)

Lymphoma is the most common blood cancer in dogs (and cats) and equates to 6% of total dog cancers. Chemotherapy is the current standard of care, with approximately 300,000 dogs diagnosed per year in the U.S. Treatment cost ranges between \$2,500 and \$10,000.

Current treatment options for cancer tend to be human drugs used off-label to treat cancer in Companion Animals. Due to the expense involved in developing cancer treatments, this area was neglected by companies in the past. As such, effective cancer treatments aimed specifically at pets would address a large unmet need, based on our research. The table below shows that veterinarians around the world are not very satisfied with their cancer management options.

#### Veterinarian Satisfaction with Cancer Management Options



Source: Oncology Insight. Vetnosis, February, 2008.

#### We highlight some pet oncology products on the market and in development.

- **ZTS** currently markets Palladia (toceranib phosphate) in the U.S. for the treatment of mast cell cancer tumors in dogs. According to ZTS, this product is much smaller than \$40MM in annual sales.
- **KIN** has one small molecule and two biologics in developments. KIND-007 is a BTK inhibitor for cancer/immune disease in cats and dogs, KIND-504 is a cancer vaccine for dogs, while KIND-501 is an Anti-VEGF fusion protein for the treatment of cancer in dogs.
- **PETX** expects to obtain a full license to sell two drugs, AT-004 and AT-005, which target B-cell lymphoma and T-cell lymphoma in dogs. Additionally Aratana has an additional two products in early stage (AT-008 and AT-009) that target lymphoma and mast cell tumors in dogs.
- **VetDC** is currently developing two molecules for VDC-1101 (rabacfosadine) for canine and feline lymphoma, and VDC-597 (PI3K/MTOR inhibitor) for various cancers. VetDC anticipates filing VDC-1101 in 2014 and VDC-597 in 2015.



## PAIN

**The pet Pain market is ~\$1B worldwide, based on our diligence.** Although this market is sizable, there is still an unmet need for drugs with better side effect profiles that can be used chronically (alternatives to NSAIDs). The NSAID segment is one of the fastest growing categories in pet therapeutics over the last fifteen years and a mainstay of treatment. It continued to expand with four additional NSAID Coxib approvals and the approval of the first of five generic carprofen products starting in 2005. Rimadyl remains the leading prescription treatment, with 2011 U.S. sales of \$90MM and 40% market share of NSAIDs. According to Brakke, sales of generic carprofen were \$20MM, or 9% market share, in 2011, up 25% from 2010. Given the side effects and required monitoring needed for NSAIDs, ~50% of chronically ill dogs cannot be treated. Some dogs have a sensitivity to NSAIDs (renal, hepatic/GI, toxicity, death). Also, in the U.S., there are no veterinary NSAIDs approved for oral use in cats.

Currently pain in companion animals is treated using NSAIDs such as carprofen, deracoxib, etodolac, firocoxib, and meloxicam. Chronic pain can also be treated by using tramadol, gabapentin, or amantadine. Most veterinarians use a combination of several medications to achieve better pain control. Veterinary NSAIDs approved for use in dogs include Etogesic (etodolac), Rimadyl (carprofen), Metacam (meloxicam), Deramaxx (deracoxib), Previox (firocoxib), Zubrin (tepoxalin), and Novox (carprofen).

Veterinarians perform approximately 19MM dog surgeries and 14MM cat surgeries each year. Approximately 50% of dog surgeries and 58% of cat surgeries, respectively, are spays and neuters, while other common surgeries include cancer surgery, declaw, cruciate repairs, and fracture repairs. There is no established protocol for the use of pain medications in these surgeries and pain management practices have traditionally been based on the veterinarian's views on the level of pain associated with a specific surgical procedure and the perceived pain tolerance of the pets. Recently, as pet owners have begun requesting analgesia for their pets' painful conditions, veterinarians have made advances in treating pain in pets.

According to the April 2012 Brakke Consulting Pain Management Products Survey, the U.S. cat and dog analgesic market was approximately \$260MM in 2011 and consisted mostly of NSAIDs with sales of approximately \$220MM. According to a survey of 233 veterinarians conducted by Brakke Consulting in March 2012, veterinarians recommended NSAID therapy for 82% of the dogs they treated with osteoarthritis, and they believe approximately 60% receive treatment. The Market Dynamic Inc. sales audit data shows that over 4MM dogs per year are receiving an average of 20 days of treatment with NSAID therapy.

Osteoarthritis is the most common inflammatory joint disease in pets. The prevalence of osteoarthritis increases with age, usually occurring in cats and dogs aged nine years or older, but it can occur even in young animals. Parnell Pharmaceuticals estimates the market for osteoarthritis prescription drugs in the U.S. and the EU together are over \$410MM in annual sales, and the global market for alternative treatments is at least another \$500MM in annual sales. In addition to drugs, there are supplements, also known as nutraceuticals, that are commonly used to aid in the control of the clinical signs of osteoarthritis.

### We highlight some pet pain products on the market and in development.

- **ZTS** currently markets Rimadyl (carprofen) for the relief of pain and inflammation associated with osteoarthritis and for the control of postoperative pain associated with soft tissue and orthopedic surgeries in dogs.
- **Novartis Animal Health** currently markets Deramaxx for the control of pain and inflammation associated with osteoarthritis and for the control of postoperative pain and inflammation associated with orthopedic surgery in dogs. It also sells Onsior for pain relief in cats and dogs.
- **KIN** is developing CereKin for the treatment of osteoarthritis pain in dogs and horses. CereKin has a different mechanism of action than NSAIDs. It is a cytokine inhibitor

and downregulates TNF. If approved, CereKin will be an oral, chewable, beef-flavored formulation of diacerein (interleukin-1 beta inhibitor).

- **PETX** expects to get U.S. approval for two dog pain products in 2016. AT-001 is indicated for pain and inflammation associated with osteoarthritis. AT-003 is indicated for post-operative pain management. PETX is currently engaged in studies to extend these two pain products to include the treatment of cats. If approved AT-001 would compete with Rimadyl (ZTS), generic Carprofen, Deramaxx (NVS), Previcox (Merial), and Metacam (Boehringer Ingelheim), as well as KIN's diacerin.
- **NextVet** is developing NV-01 and NV-02 to treat pain in dogs and cats, respectively. The dosing will be a subcutaneous injection every 4 to 8 weeks, which is more convenient than daily oral dosing and there are no observable side effects to date.

## ALLERGY AND DERMATOLOGY

We estimate the pet Allergy market has peak sales potential of over \$3B, growing at a 5-year CAGR (2014 to 2019) of 5.1%. This growth should be driven by increasing diagnosis of pet allergies, availability of new treatments, and higher ownership of breeds that have allergies (French Bulldog, Staffordshire Bull Terrier and West Highland White Terrier). In our analysis we apply a brand Rx cost per year to the number of dogs treated. The actual sales may be lower since it is our understanding that there are generic human Rx drugs used off label to treat pets as well.

(\$ in MMs)	Year Ended December 31st,							
	2014E	2015E	2016E	2017E	2018E	2019E	2020E	2021E
Allergy Market								
Dog Allergy Market								
# Dogs w/ith Allergies That are Treated (MM)	16	16	17	17	17	18	18	19
Brand Rx Cost Per Year (\$150/year)	\$150	\$154	\$158	\$162	\$166	\$170	\$174	\$178
Dog Allergy Market	\$2,370	\$2,490	\$2,616	\$2,748	\$2,888	\$3,034	\$3,187	\$3,349

Source: Guggenheim Securities, LLC and Company Reports

Allergies are the single most prevalent disease in dogs, with approximately 1 in 10 dogs suffering from allergies. According to American Veterinary Medical Association, there are up to 11MM allergic dogs in the U.S. alone. Agria Pet Insurance estimates the incidence of allergies has doubled since 2005, with more than 20% of vet visits allergy related. Worldwide there could be as many as 16MM dogs affected by allergies. Allergies appear in pets anywhere from six months to three years of age, with the high risk breeds showing symptoms from six to eighteen months. There are three kinds of animal allergies: 1) Atopic Dermatitis; 2) Flea Allergic Dermatitis; and 3) Food Allergies.

Allergies tend to be a lifelong problem but a pet's allergies can usually be controlled with improvement being seen within three to six months, but for some pets it may take up to a year to see the full benefit. It is estimated that about 75% of pets respond well to immunotherapy. Some pets require treatment for life, others are able to discontinue immunotherapy after three to four years without relapsing.

**The most common pet dermatologic diseases include fleas, allergies, and atopic dermatitis.** There has been an increasing focus on Animal Health drugs used to treat atopic dermatitis. The standard of care is Atopica (cyclosporine), but it inhibits T-lymphocytes, which makes it a potent immunosuppressant. Although Atopica is effective, side effects include vomiting and diarrhea as well as an increased risk of infections.

## Drugs Commonly Used to Treat Skin Disorders

Class	Specific Drugs
<b>Antistaphylococcal antibiotics</b>	
<b>Cephalosporins</b>	Cefaclor, cephadroxil, cephalexin
<b>Penicillins</b>	Amoxicillin-clavulanate, oxacillin
<b>Fluoroquinolones</b>	Enrofloxacin, marbofloxacin, orbifloxacin
<b>Sulfonamides</b>	Trimethoprim-sulfadiazine, trimethoprim-sulfamethoxazole
<b>Macrolides and lincosamides</b>	Clindamycin, erythromycin, lincomycin
<b>Antifungal medications</b>	Amorolfine, amphotericin B, fluconazole, flucytosine, griseofulvin, itraconazole, ketoconazole, nystatin, potassium iodide, sodium iodide, terbinafine
<b>Antihistamines</b>	Clemastine, chlorpheniramine, cyproheptadine, diphenhydramine, hydroxyzine, terfenadine, trimепразине
<b>Antiparasitics</b>	Cythioate, ivermectin, lufenuron, milbemycin, moxidectin, nitenpyram, selamectin
<b>Glucocorticoids</b>	Betamethasone, dexamethasone, flumethasone, hydrocortisone (cortisol), methylprednisolone, prednisolone, prednisone, triamcinolone
<b>Psychotropic drugs</b>	Amitriptyline, clomipramine, diazepam, doxepin, fluoxetine

Source: Merck Manual for Pet Health

Atopic dermatitis affects 10% of all dogs. Dogs and their owners both have an extremely poor quality of life. Some dogs are put down because of the disease. Current therapies (steroids, cyclosporin, JAK2 inhibitor) are effective but have side effects from long-term use (immunosuppression, osteoporosis, cataracts, etc.). There is a strong need for a good maintenance drug for atopic dermatitis.

### We highlight some atopic dermatitis products on the market and in development.

- **ZTS** currently markets Apoquel (oclacitinib tablet) for the control of pruritus, or itching, associated with allergic dermatitis and the control of atopic dermatitis in dogs, as well as Convenia (cefovecin sodium) for the treatment of common bacterial skin infections in cats and dogs. On its most recent earnings call, ZTS said that it expects Apoquel to be a blockbuster drug for the company and will represent 1% of ZTS's sales by the end of 2014 (\$47MM by our estimate). ZTS's portfolio also includes Fungassay, an in-house culture medium that provides a quick method for confirming diagnosis of dermatophyte infections.
- **KIN** is developing a high-dose, oral, chewable, beef-flavored formulation of fexofenadine for atopic dermatitis. We believe AtoKin has peak sales potential of \$90MM for dogs. If approved, AtoKin could be effective as both a first-line therapy and as a long-term maintenance therapy for chronic atopic dermatitis in dogs, with a safety profile superior to currently approved therapeutics.
- **PETX** has begun lead selection on its AT-010 compound indicated for atopic dermatitis in dogs. The company will look to move into proof-of-concept studies in the next 18 – 24 months. PETX believes that its antibody could offer advantages over current therapies with weekly to monthly, rather than daily, doses.
- **NextVet** is developing NV-06/08 for the treatment of atopic dermatitis in dogs. This is a monoclonal antibody/Fc Receptor protein and the target is tumor necrosis factor. The dosing will be a subcutaneous injection every 4 to 8 weeks, which is more convenient than daily oral dosing and there are no observable side effects to date.

## GASTROINTESTINAL

We estimate the worldwide pet Gastrointestinal (GI) market is \$600MM to \$700MM, growing at 5-year CAGR (2014 to 2019) of 4.5%. The growth is being driven by the increasing lifespan of Companion Animals, since many GI problems are lifelong conditions with no existing cure. Commonly diagnosed GI conditions include acute gastroenteritis, colitis, constipation, diarrhea, pancreatitis, exocrine pancreatic insufficiency, and small intestinal malabsorption. Antimicrobial agents are used for the treatment of bacterial diseases, and anthelmintics for parasitic diseases. There is no specific therapy for treatment of viral diseases. In our analysis we apply a brand Rx cost per year to the number of dogs treated. The actual sales may be lower since it is our understanding that there are generic human Rx drugs used off label to treat pets as well.

(\$ in MMs)	Year Ended December 31st,							
	2014E	2015E	2016E	2017E	2018E	2019E	2020E	2021E
GI Market								
Total No. of Dogs in the U.S. ('MM)	83.3	85.0	86.7	88.4	90.2	92.0	93.8	95.7
Estimated Incidence of IBD & GI problems	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Estimated % of dog ow ners seeking treatment	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
# Dogs U.S. with IBD/GI receiving treatment ('MM)	4.4	4.5	4.5	4.6	4.7	4.8	4.9	5.0
Total No. of Dogs ex-U.S. ('MM)	86.5	88.2	90.0	91.8	93.6	95.5	97.4	99.4
Estimated Incidence of IBD & GI problems	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Estimated % of dog ow ners seeking treatment	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
# Dogs ex-U.S. with IBD/GI receiving treatment ('MM)	2.6	2.6	2.7	2.8	2.8	2.9	2.9	3.0
# Dogs w ith IBD/GI receiving treatment ('MM)	7.0	7.1	7.2	7.4	7.5	7.7	7.8	8.0
Rx Cost per Year (\$0.25 per day @365)	\$91	\$94	\$96	\$98	\$101	\$103	\$106	\$108
IBD/GI Dog Market	\$636	\$665	\$695	\$727	\$760	\$794	\$830	\$868

Source: Guggenheim Securities, LLC and Company Reports

Drugs Used to Stimulate Appetite*		Isopropamide		Dog, cat
Drug	Animal(s)	Meclizine	Dog, cat	
Boldenone undecylenate	Dog, cat, horse	Metoclopramide	Dog, cat	
Cyproheptadine	Cat	Ondansetron	Dog, cat	
Diazepam	Cat	Prochlorperazine	Dog, cat	
Megestrol acetate	Dog, cat	Propantheline	Dog, cat	
Oxazepam	Cat	Antilcerative Drugs*		
Prednisone	Dog, cat, horse	Drug	Animal(s)	
Stanozolol	Dog, cat, horse	Antacids	Dog, cat	
Drugs Used to Control or Stimulate Vomiting*		Cimetidine	Dog, horse	
Drug	Animal(s)	Famotidine	Dog, horse	
Emetics (drugs that cause vomiting)		Misoprostol	Dog	
Apomorphine	Dog, cat	Omeprazole	Dog, horse	
Hydrogen peroxide	Dog, cat	Ranitidine	Dog, horse	
Salt	Dog, cat	Sucralfate	Dog, cat, horse	
Syrup of ipecac	Dog, cat	Antidiarrheal Drugs*		
Xylazine	Cat	Activated charcoal		
Antiemetics (drugs that inhibit vomiting)		Aminopentamide		
Acepromazine	Dog, cat	Bismuth subsalicylate		
Butorphanol	Dog	Diphenoxylate		
Chlorpromazine	Dog, cat	Isopropamide		
Cyclizine	Dog, cat	Kaolin-pectin		
Dimenhydrinate	Dog, cat	Loperamide		
Diphenhydramine	Dog, cat	Paregoric		
Dolasetron	Dog, cat	Propantheline		

Source: Merck Manual for Pet Health

\*Many of the drugs listed are not directly approved by the FDA for use in the species listed. Veterinarians decide what drug and dosage to use for an animal based on their experience, published reports, and continuing education.

**VETERINARY INDUSTRY CONFERENCES & MEETINGS (in 2014)**

Event	Date	Location	Link
The North American Veterinary Community (NAVC) Conference	1/18-1/22	Orlando, FL	<a href="http://navc.com/conference/">http://navc.com/conference/</a>
86th Annual Western Veterinary Conference (WVC)	2/16-2/20	Las Vegas, NV	<a href="http://www.wvc.org/">http://www.wvc.org/</a>
American Animal Hospital Association (AAHA) Annual Conference	3/20 - 3/23	Nashville, TN	<a href="https://www.aahanet.org/">https://www.aahanet.org/</a>
Conventions for Veterinary Care (CVC), Washington, D.C.	5/8 - 5/12	National City, MD	<a href="http://www.thecvc.com/">http://www.thecvc.com/</a>
American College of Veterinary Medicine (ACVIM) Forum	6/4 - 6/7	Nashville, TN	<a href="http://www.acvim.org/default.aspx">http://www.acvim.org/default.aspx</a>
American Veterinary Medical Association (AVMA) Annual Convention	7/25 - 7/29	Denver, CO	<a href="https://www.avma.org/">https://www.avma.org/</a>
Conventions for Veterinary Care (CVC), Kansas City	8/22 - 8/25	Kansas City, MO	<a href="http://www.thecvc.com/">http://www.thecvc.com/</a>
Veterinary Emergency & Critical Care Society (VECCS) Conference	9/10 - 9/14	Indianapolis, IN	<a href="http://www.veccs.org/">http://www.veccs.org/</a>
39th World Small Animal Veterinary Association Congress	9/16 - 9/19	Cape Town, South Africa	<a href="http://www.wsava2014.com/">http://www.wsava2014.com/</a>
Veterinary Cancer Society (VCS) Annual Conference	10/9 - 10/11	St. Louis, MO	<a href="http://www.vetcancersociety.org/">http://www.vetcancersociety.org/</a>
American College of Veterinary Surgeons (ACVS) Symposium	10/16 - 10/18	San Diego, CA	<a href="https://www.acvs.org/">https://www.acvs.org/</a>
Conventions for Veterinary Care (CVC), San Diego	12/4 - 12/7	San Diego, CA	<a href="http://www.thecvc.com/">http://www.thecvc.com/</a>

Source: Industry Association Websites

**VALUATION METHODOLOGY AND RISKS**

**Kindred Bio Valuation Methodology.** We use a DCF analysis to arrive at our 12-month price target of \$31. We used a WACC of 28% and exit multiples of 11x forward EBIT. This compares favorably to Kindred Bio's peers, which trade, on average, at a forward EV/EBIT of 17x. Risks to our valuation include: 1) pipeline setbacks for drugs; 2) CereKin, AtoKin and SentiKin peak sales below expectations; and 3) competition from larger and better capitalized animal health companies in the industry.

**Zoetis Valuation Methodology.** We use a blend of Price to Earnings (P/E), Discounted Cash Flow (DCF), and Sum-of-the-Parts analysis to get to our 12-month price target of \$40. Using a P/E analysis, we arrive at a 12-month value of \$36. We apply a 20x multiple to our 2015E EPS of \$1.78. Our DCF analysis arrives at a 12-month value of \$42. We use a WACC of 6% and an exit multiple of 9 times EBIT. Using a Sum-of-the-Parts analysis, we arrive at a 12-month value of \$48. We have excluded any redundant overhead to determine what each division would be worth if the company were broken up and/or acquired. Risks to our valuation include: 1) separation from parent company is more expensive or takes longer than anticipated; 2) operating margin expansion is lower than expected; and 3) increasing generic competition for key drugs that do not have patent protection.



**COMPANIES MENTIONED**

Agria Pet Insurance (Private)

Aratana Therapeutics (PETX, NC, \$12.57)

Boehringer Ingelheim (Private)

Eli Lilly (LLY, NC, \$59.80)

Kindred Bioscience (KIN, BUY, \$18.11)

Merck (MRK, NC, \$56.81)

NextVet (Private)

Novartis (NVS, NC, \$90.21)

Parnell Pharmaceuticals (Private)

Sanofi (SNY, NC, \$52.79)

SmartVet (Private)

VetDC (Private)

Vet Therapeutics (Private)

Vetnosis (Private)

Zoetis (ZTS, BUY, \$30.54)

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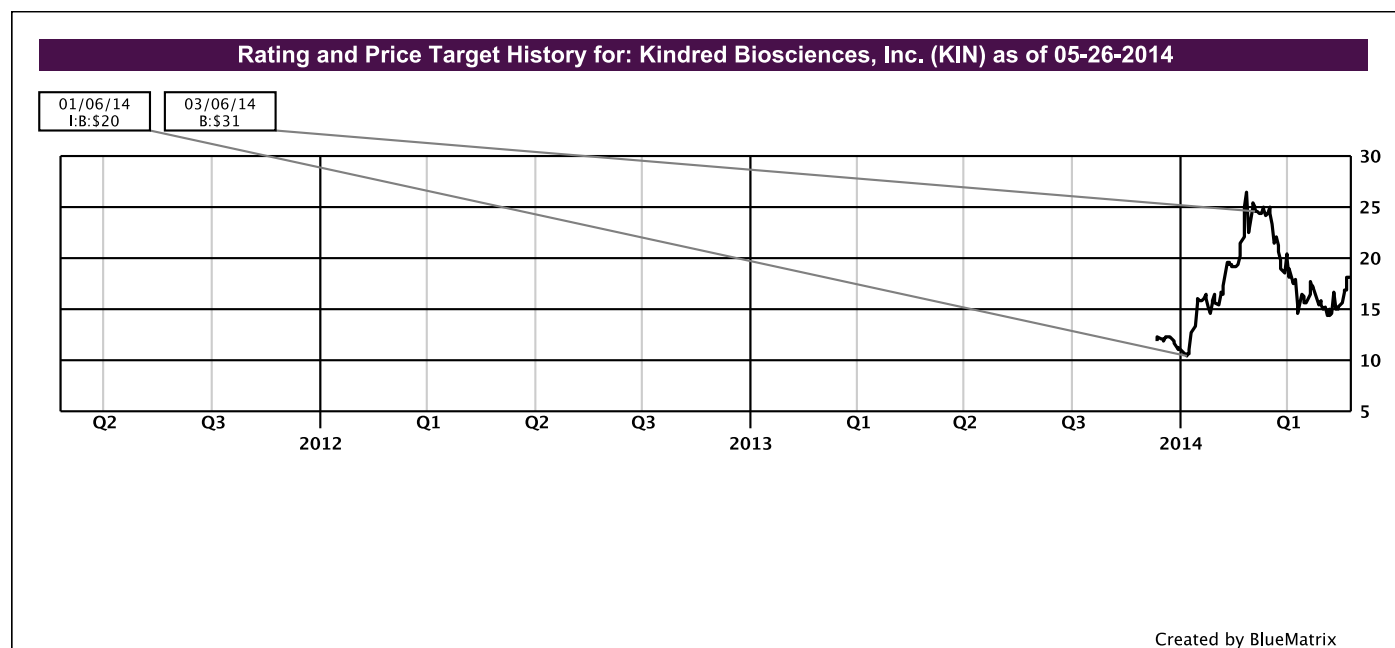
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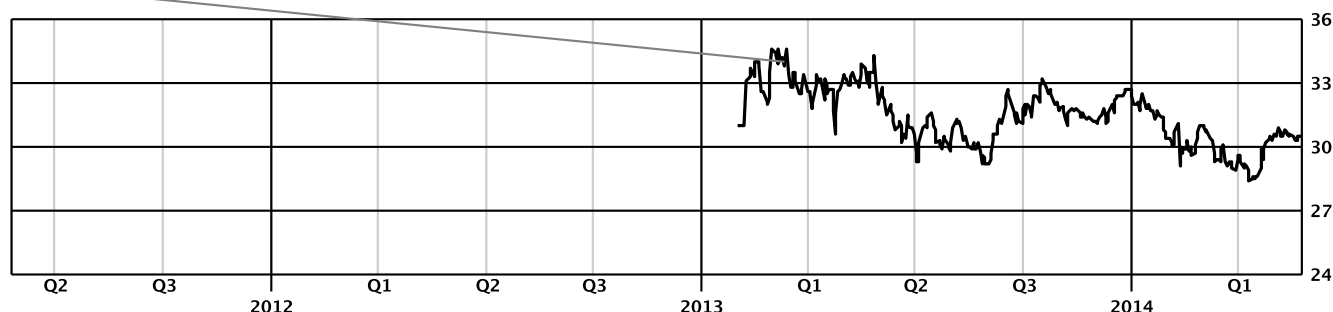
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## Rating and Price Target History for: Zoetis Inc. (ZTS) as of 05-26-2014

03/13/13  
I:B:\$40

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Sell	6	3.00%	0	0.00%

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