Pet Owners and Small Farms Worldwide Need New and Better Medical Injection Options to Keep Their Animals Healthy

Animal health and human health are closely linked. At home, healthy pets make happier, longer-lived companions. On farms, sick animals put human health at risk, while healthier livestock reduces the spread of disease and produces safer food.

"…pet owners [have] started seeing their animals as family, and are desperate to help these family members live longer, healthier, more comfortable lives…

People lavish their pets with love and concern like they do other family members, with total U.S. pet industry expenditures project to rise almost $6 billion in two years to more than $72 billion in 2018."

MICHAEL HELMSTETTER
PRESIDENT, TECHACCEL
"The Future of Animal Health"
Forbes, Aug. 21, 2018[1]

According to the Animal Health Institute, "24 billion chickens, more than 1 billion cattle and sheep, 750 million pigs and goats, 500 million dogs and 400 million cats" worldwide benefit from innovations in animal health.

KATHLYN STONE
PRESIDENT, TECHACCEL
"ANIMAL PHARMACEUTICAL COMPANIES"
The Balance, April 22, 2019[2]

The $45 billion global animal health market is forecast to reach $70 billion in 5 years.[3]

Global animal health includes care for pets and animal companions.

It also includes care for livestock on large industrial farms in High-Income Countries (HIC), as well as animals on tens of millions of subsistence farms and small family farms in Low- and Middle-Income Countries (LMICs).

The global animal health market is enormous and growing fast. In 2017, U.S. pet owners spent an estimated $69 billion on acquiring, feeding and caring for their pets.[4] This includes approximately $15 billion for supplies and over-the-counter medications.[5] According to the American Animal Hospital Association (AAHA), Americans spent $35 billion on veterinary care in 2015.[6]

There were 157 million U.S. pets in 2012, according to industry figures, a number that has grown considerably since then.[7] The world's farm animal population includes roughly 25 billion cattle, chicken, sheep, pigs and goats.[8]

According to the Animal Health Institute, animal pharmaceuticals are used chiefly to treat or prevent diseases or infections. As is true for humans, it is also the case that pets and farm animals receive vaccines to address some diseases and conditions, while receiving non-vaccine medicines to treat other conditions. For example, veterinarians treat animals with pharmaceuticals such as anti-parasitic drugs, anti-inflammatory medications, anesthetics, pain medications, antibiotics, and specialized products for managing reproductive, cardiovascular, or metabolic conditions.[9]

If farm animals in these sectors get sick or die, the humans who own them can be at risk, too – not just for adverse health and economic impacts, but for the family's physical survival.

Many factors are combining to create growing needs for more and better animal medical care.

Pet owners are buying more pets and lavishing more resources and attention on their animals, including medical care.

Meanwhile the number of zoonotic (animal-to-human) diseases and food-borne diseases is rising significantly.

The global animal health market is expected to see a combined annual growth rate of 5.7% from 2019 to 2026.[10] A number of factors are contributing to this rapid growth.

To begin with, the growing human population drives growth in the animal population. As more families achieve middle class status around the world, they add more pets to the family.

In the farm sector, a growing human population means more mouths to feed around the world. As a result, demand for meat and poultry rises and more livestock is needed to meet this growing demand.

Another critical factor driving the growing demand for animal healthcare is the expanding rate of zoonotic and food-borne diseases around the world, in both HICs and LMICs. In response, pharma companies are working to develop advanced vaccines and medicines that can more effectively prevent and treat the major diseases.

Veterinarians, pet owners and farm owners, in turn, are signaling higher demand for these meds and vaccines in order to keep animals safe and healthy. In the U.S., the government is promoting greater use of veterinary products for the same reasons.

The following pages provide a high-level overview of the pet and farm animal medical sectors in turn.

As the world's pet population grows, the future of pet care is not more visits to the vet; it's more home care.

Around the world, people love their pets and animal companions…and it's no wonder, considering how much pets add to human health and quality of life.

As the U.S. National Institutes of Health has stated, "Nothing compares to the joy of coming home to a loyal companion. The unconditional love of a pet can do more than keep you company. Pets may also decrease stress, improve heart health, and even help children with their emotional and social skills."[11]

The global pet population is large and rapidly getting larger. For example, around the world, an estimated 400 million dogs serve as animal companions to humans.[12] In the U.S. alone, the pet population includes more than 120 million dogs, 130 million cats and 50 million other animals ranging from fish to reptiles, birds and horses.[13]

The American Medical Veterinary Association reports the typical dog is taken to the vet's office 2.6 times per year.[14] Average visit cost: $257.[15] Even 65% of veterinarians believe pet care costs too much.[16]

The world pet population expands as the population and incomes grow. Another factor driving demand for more pet healthcare: owners increasingly treat pets as family members, seeking the best available treatment, comfort remedies and preventatives.

As *Forbes* recently reported, "…pet owners [have] started seeing their animals as family, and are desperate to help these family members live longer, healthier, more comfortable lives…People lavish their pets with love and concern like they do other family members, with total U.S. pet industry expenditures project to rise almost $6 billion in two years to more than $72 billion in 2018."[17]

Many owners do not vaccinate pets, in part due to high costs… but not vaccinating costs more.

Medical injections are a significant portion of pet health expenses, although statistics are both rare and widely varied.

Some sources estimate 500,000 annual injections worldwide drive sales of more than $8 billion/year in pet medicine and supplies.[18] Other sources project China alone sees 100+ million annual injections for pets.[19]

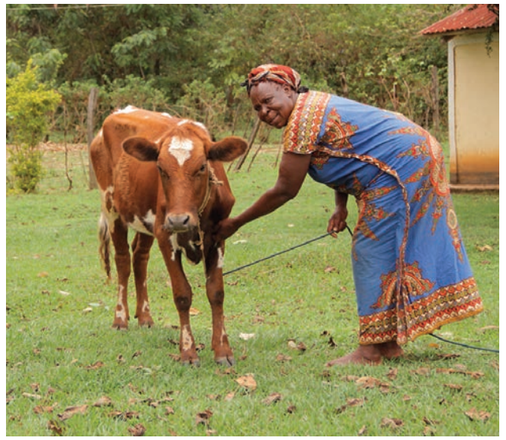
Vaccines are key injectables for animals, with a global compounded annual growth rate of 7.4% thru 2022.[20] Again, costs can seem high. For example, a parvo vaccination by an independent veterinarian in a moderately priced Midwestern market typically costs $35 to $50, plus office visit fees.[21] A package of 3-4 vaccinations plus testing for common diseases costs $99 at a leading veterinary chain store.[22]

Although animal vaccines are a rapidly growing industry, most of the vaccines administered to animals goes to farm livestock (particularly on large industrial farms).

The situation for pets is markedly different, and offers cause for concern. A 2016 survey suggests 53% of U.S. dog owners and 36% of cat owners don't vaccinate their pets at all, or somehow obtain vaccinations outside the veterinarian's office.[23] Cost is one reason, yet skipping vaccinations and waiting to treat an infection often costs far more. Canine parvovirus treatment costs begin at $600 and can amount to several thousand dollars.[24]

Of greater concern, when animal population vaccination rates dip below 70%, herd immunity can be lost, making widespread disease more likely.[25]

On small family farms around the world, human health and animal health are closely linked.



On subsistence farms and small independent farms in Low- and Middle-Income Countries (LMICs), animals are indispensable to human well-being.

The size of the global farm animal population is reflected in statistics provided by International Livestock Research Institute, in Kenya, the UN's Food and Agriculture Organization, and other groups.

These groups estimate that farms worldwide maintain 1.4 billion cattle, 1.9 billion sheep and goats, 980 million pigs, and 19.6 billion chickens.[26]

These animals are not just found on large-scale industrial farms. Hundreds of millions of small family farms worldwide also keep livestock, from dairy cows and goats to sheep and poultry. For billions of people in many LMICs, these animals generate primary income including valuable products such as wool, hair, silk, hides, skins, furs, wax, feathers, bones, horns and more.

In addition, these "living renewable resources" also provide the chief means of physical survival for many families on small farms, serving as their primary source of food since animals and bees produce meat, milk, eggs and additional edibles.

If farm animals in these sectors get sick or die, the humans who own them can be at risk, too – not just for adverse health impacts, but for the family's physical survival.

Unfortunately, in much of the word – particularly in LMICs – most of farm animals go unvaccinated and under-treated when they contract disease.

Injectable medicines and vaccines are an important tool for keeping animals healthy, which keeps people healthy.

The fallout from an avian flu infection of U.S. farm animals demonstrates the high cost of allowing animals to get sick.

The 2014 avian flu infected untold numbers of chickens on hundreds of U.S. farms in 21 states, triggering the destruction of more than 50 million infected or potentially infected birds.

Other countries imposed trade bans against U.S. poultry, resulting in a total cost to the U.S. economy exceeding $3 billion.[27]

Clearly, the cost of allowing pathogens to infect animal populations is high in any nation, regardless of national income. The world's farms are expected to spend US$6.5 billion on animal vaccines by 2025.[28] But these vaccines are almost exclusively used in industrial farming operations.

Unfortunately, vaccination rates for farm animals are very low in many LMICs. For example, the UN estimates that only 38% of livestock in Tanzania and 21% in Uganda receive vaccines, and even fewer animals in such countries may receive treatment for parasites and other infections.[29]

Animal infections can have a snowballing effect. As noted earlier, when animal population vaccination rates dip below 70%, herd immunity can be lost, making widespread disease more likely.[30] The applies to livestock as well as pets. Small farms need a new, low-cost, easy-to-implement solution.

Pets and small farm animals get medicine and vaccine injections from traditional syringes and glass vials.

Syringes and glass vials are 165-year-old technology that present many significant drawbacks for global animal health.

From cost to coverage, convenience, adherence, safety and more, syringes and glass vials come with many issues that work against optimal health for animals.

Cost and coverage: Using a traditional syringe that is filled from a glass vial, the TCOD (Total Cost of Delivery) per dose can be quite expensive. Costs vary, but many pet owners and subsistence farmers do not vaccinate their animals due to high costs, leading to livestock deaths and increasing risks of zoonotic disease. Transporting glass vials is also expensive due to weight.

Convenience and adherence: Trips to veterinarians can be expensive and time-consuming, reducing adherence. With regulatory approval, an easy-to-use delivery alternative such as a low-cost prefilled syringe could be deployed by pet owners and small farm owners to inject their animals at home.

Safety: Improperly reused traditional syringes in medical settings lead to contamination of both syringes and multi-dose glass vials, spreading disease. Pets and farm animals worldwide are vulnerable to the same danger that infects 20 million humans annually.

Additional safety issues include delamination (glass flakes shear off inside the vial and mix with the contents) and breakage, forcing costly recalls.

Environmental impact: Billions of glass vials are manufactured each year in a slow, costly, highly energy-intensive process. Their manufacture creates substantial industrial waste, and disposing of empty vials creates still more waste.

Animal injections could potentially be affordable and easier to perform with a prefilled format.

Drug delivery devices for humans have long included squeeze-activated plastic prefilled devices; similar technology could potentially be available for pets and farm animals.

ApiJect plans eventually to develop several different sized prefilled BFS injectors* for animals. Subject to regulatory approval, they could potentially serve the pet and farm animal markets, helping increase coverage.

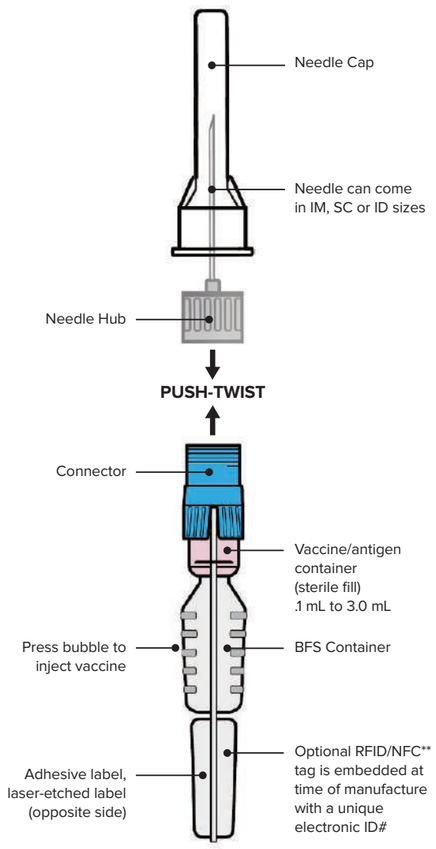
ApiJect envisions formatting each animal injector as a one-dose, single-use, prefilled plastic device. Advanced BFS manufacturing and materials would potentially support economic efficiency and affordability. Since prefilled formats require no filling from a glass vial, and would be precisely prefilled at the time of manufacture, some animal owners could potentially inject their animals without requiring veterinary services.

Because these injectors would be precisely prefilled at the time of manufacture, there is no need for a glass vial and no need for the caregiver to fill the device. Pet owners and farmers could potentially get appropriately sized injectors in bulk by prescription from a vet, then inject their animals at home as instructed. This could avoid long trips from farm to city, and reduce costs through fewer vet office visits. Users would simply squeeze the plastic container to inject the medicine or vaccine.

ApiJect's planned products for animals would feature a special needle hub that supports various needle sizes: heavy-gauge needles for thick hides (cattle, goats, etc.) and lighter-gauge needles for dogs and cats, as well as young calves, pigs and poultry. This specialty hub would not accept needles sized for humans.

A Prefilled Injector for Animals

The BFS container is SEPARATE from the needle, making it easy to mix and match needle sizes for different types of animals.



*Products shown for informational purposes only, not for use in product promotion. **RFID is Radio Frequency ID. NFC is Near Field Communications. ApiJect's Prefilled Injector and other products have not been reviewed or cleared by FDA or other regulatory authorities for distribution.

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