Science Diplomacy in the Veterinary Sector: A Propellant for "Viksit Bharat 2047"

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India's vision of becoming a developed nation, or "*Viksit Bharat*," by 2047 hinges on its ability to address various challenges, from food security to public health and sustainable development. While sectors like technology and education often dominate the discourse, the veterinary sector offers an equally vital yet underappreciated dimension. Veterinarians contribute not only to animal health and welfare but also to broader fields like human health (via the One Health approach), environmental sustainability, and economic growth. Amid rising concerns over zoonotic diseases, food shortages, and environmental degradation, veterinarians are uniquely positioned to offer impactful scientific and diplomatic solutions.

The convergence of veterinary science with critical sectors such as public health, food security, and environmental conservation presents unique opportunities for leveraging science diplomacy. Integrating this approach into the veterinary domain enables India to engage effectively in global partnerships, influence international policies, and address shared challenges. By harnessing the potential of veterinary science diplomacy, India can accelerate its progress toward becoming "*Viksit Bharat*" by 2047.

Role of Science Diplomacy in the Veterinary Sector

Science diplomacy within the veterinary field provides a platform for veterinarians to engage in cross-border collaborations, knowledge-sharing, and influencing global policies on pressing global issues. Examples of successful initiatives include:

- Global Health Security Agenda: Contributions to international frameworks designed to combat zoonotic diseases through expertise and best practices.
- PREDICT: A project of USAID's Emerging Pandemic Threats program focused on wildlife disease surveillance through international collaboration.
- FAO-OIE-WHO collaboration: Enhancing food safety and implementing the "One Health approach".

Here's how the inclusion of science diplomacy in the veterinary profession can help India achieve its long-term development goals by fostering international collaboration and innovative solutions:

***Addressing Zoonotic Diseases**:* Zoonoses (diseases transmitted between animals and humans) are a major global health concern, exemplified by pandemics like COVID-19. With India's large livestock population and close human-animal interaction, the country is particularly vulnerable. Collaborating with international health bodies like the World Health Organization (WHO) and the World Organisation for Animal Health (WOAH) can help to develop robust surveillance systems, enable data sharing, and adopt best practices for early detection and control of zoonotic outbreaks. This proactive engagement enhances public health outcomes and strengthens India's leadership in global health.

***Ensuring Food Security**:* Veterinarians are integral to the health and productivity of livestock, poultry, and fisheries, which are vital for food security and rural livelihoods. Global collaboration through organisations like the Food and Agriculture Organisation (FAO) and the World Trade Organisation (WTO) facilitates knowledge exchange and adoption of sustainable livestock management practices. Veterinarians can participate in bilateral and multilateral agreements addressing climate-resilient agriculture, ensuring food security while protecting the environment. These measures align with India's sustainable development goals by reducing the carbon footprint of livestock production and improving resource efficiency.

***Capacity Building and Knowledge Exchange**:* Advancements in veterinary science—such as precision livestock farming, traceability, vaccine development, and biotechnology—require collaborative research and technology transfer. Science diplomacy facilitates partnerships with leading global institutions, offering opportunities for knowledge exchange through international partnerships, scholarships, and joint research projects. Such initiatives enable Indian veterinarians to adopt cutting-edge technologies, enhancing productivity and animal welfare standards across the country.

***Veterinary Public Health in International Trade**:* As India expands its trade in livestock products, adherence to international health standards becomes crucial. Through science diplomacy, India can engage in discussions with trading partners and international regulatory bodies to set appropriate standards and resolve trade disputes related to animal health and safety. Veterinarians can help implement global food safety standards, such as those set by Codex Alimentarius, boosting India's competitiveness in international markets and contributing to economic growth.

***Biodiversity and Wildlife Conservation**:* India's rich biodiversity faces mounting threats from habitat loss, climate change, and poaching. Veterinarians are essential in conserving endangered species and managing wildlife health. Collaborations with international wildlife organisations like Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the World Wildlife Fund (WWF) can address these challenges. Indian veterinary scientists can contribute to global research on disease ecology, wildlife conservation, and ecosystem management, thereby safeguarding biodiversity and strengthening global environmental efforts.

One Health Approach: The interconnectedness of human, animal, and environmental health under the One Health framework is central to tackling challenges like antimicrobial resistance and zoonotic diseases. By engaging in global One Health initiatives, Indian veterinarians can influence policy and collaborate on solutions addressing public health, food safety, and sustainability, furthering both domestic and international health agendas.

Climate Change Mitigation and Adaptation: Climate change poses challenges for livestock productivity and disease management. Indian veterinarians can collaborate on climate-resilient livestock practices and technologies to reduce greenhouse gas emissions. Participation in global frameworks like the United Nations Framework Convention on Climate Change (UNFCCC) can enable Indian veterinary professionals to develop policies that promote sustainable livestock systems, ensuring that the country contributes to global climate goals while securing its food supply.

Combatting Antimicrobial Resistance (AMR)*:* The misuse of antibiotics in veterinary and human medicine has led to the global crisis of AMR, threatening decades of progress in healthcare. India's veterinarians can collaborate with international organisations like WHO and WOAH to develop AMR surveillance, management, and regulation strategies. They can help influence national and international policies by ensuring the prudent use of antimicrobials in animals. Collaborative research initiatives can contribute to global efforts in developing alternatives to antibiotics, such as vaccines, probiotics, and biosecurity measures, which would have a lasting impact on both global public health and food security.

Veterinary Input in Sustainable Trade*:* As India's livestock sector expands, veterinarians will play an essential role in ensuring that animal products meet international safety and health standards. Science diplomacy can help align India's trade practices with international norms, boosting economic growth and ensuring sustainable development. Veterinary professionals can help resolve trade barriers related to animal health by engaging with bodies like the World Trade Organisation (WTO) and the Codex Alimentarius Commission. By improving animal health and welfare standards, veterinarians can help India increase its livestock and animal product exports, contributing to rural economic growth and national prosperity.

Strengthening Disaster Preparedness and Response*:* Veterinarians play a crucial role in disaster response, ensuring livestock and wildlife health during emergencies. Indian veterinarians can collaborate with international organisations, such as the International Federation of Red Cross and Red Crescent Societies (IFRC), for coordinated disaster response efforts, particularly in providing care for affected animals and safeguarding food security. By learning from global best practices, veterinarians can help India develop resilient systems for protecting livestock and wildlife during floods, droughts, or disease outbreaks, thus protecting livelihoods and contributing to food security.

Developing a Circular Economy*:* Maximising resource efficiency is key to sustainability in a growing population. The livestock sector is integral in achieving a circular economy, where agro by-products and food wastes can be efficiently upgraded into animal proteins. Science advocacy and fostering collaborations can empower professionals in the livestock sector to optimise bio-resource utilisation, driving sustainability.

Promoting Animal Welfare and Ethical Practices*:* Animal welfare is an increasingly important topic in international discussions, particularly with the rise of ethical consumerism. India's veterinary professionals can take the lead in promoting ethical animal welfare standards that align with international norms. Science diplomacy allows Indian veterinarians to engage with global organisations like World Animal Protection and the International Fund for Animal Welfare (IFAW), advocating for higher welfare standards in farming, transport, and wildlife management.

Livelihood and Entrepreneurship Opportunities: Information-driven science diplomacy can unlock opportunities in the livestock value chain, empowering marginalised communities and fostering rural economic growth through innovation and entrepreneurship.

India's Initiatives Supporting the Veterinary Sector

The Indian government has introduced key initiatives to enhance the veterinary sector through improved disease control, digital transformation, and international collaboration (Press Information Bureau, 2024).

- Livestock Health & Disease Control Program*:* Fully funded vaccination programs for critical livestock diseases such as Foot-and-Mouth Disease and Peste des Petits Ruminants (PPR).
- National Digital Livestock Mission*:* A transformative digital platform for identifying and registering livestock, tracking vaccination, breeding, and treatment.
- National One Health Mission: Strengthening disease surveillance and operational readiness through coordinated response strategies. Recently, a USD 25 million Pandemic Fund Project on "Animal Health Security Strengthening in India for Pandemic Preparedness and Response" was launched to strengthen laboratory capacities, improve disease surveillance, and enhance the veterinary workforce. These efforts aim to bolster resilience in animal health systems while integrating human and environmental health components.
- Poultry Disease Action Plan: Proactive measures such as biosecurity and enhanced surveillance to combat avian influenza outbreaks.

WOAH recently recognised ICAR-NIVEDI, Bangalore, as a reference laboratory for PPR and Leptospirosis. Other institutes, such as ICAR-NIHSAD, Bhopal (Avian Influenza), and KVFSU, Bangalore (Rabies), have also achieved similar distinctions. These accolades underscore India's commitment to excelling in veterinary science and contributing to global animal health standards.

Conclusions

India's journey towards becoming a *Viksit Bharat* by 2047 is deeply intertwined with its ability to tackle global challenges like zoonotic diseases, food security, climate change, and sustainable development. Veterinary science diplomacy will be the driving force behind impactful advancements in national policies and global partnerships. By embracing science diplomacy, Indian veterinary professionals will not only strengthen domestic resilience in areas like animal health, public health, and food safety but also position India as a global leader in addressing some of the most pressing issues of the 21st century. In this process of collaboration, research, and policy advocacy, veterinary professionals will play a transformative role in shaping India's development trajectory and its leadership on the global stage, contributing significantly to the realisation of "*Viksit Bharat*" by 2047.