



Current opinion on maximizing veterinary profession growth and contributions

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ABSTRACT

Veterinary profession sphere overlaps three major biology arenas namely agriculture, basic sciences, and human medicine. Thus, so far the investments in veterinary field are not proportional to the scope of their responsibilities. Rededication and rejuvenation can help veterinary profession to maximize outcomes in poverty alleviation, food security, environmental protection, integrated zoonotic disease prevention and control, integrated public services delivery, animal welfare and human-animal bond. Transforming backyard farming into farm management; symptomatic treatment philosophy into prevention and control ethos; one medicine, require capacity building, continuing education as well as curriculum reforms. Consensus needs to be built within the profession to enrol stakeholder participation in professional growth and outcomes enhancement. In this article, authors used developed world experience to suggest a customized reform and manpower empowerment approach for increasing veterinary profession stature and contributions for India. It is hoped that awareness brought forward to elevate discussion on veterinary profession opportunities would be beneficial to the profession as well as to the society.

Key words: India, Veterinary profession

Axis of veterinary medicine would be relocated from west to Asia soon obligated by necessity rather than 'by choice'. Veterinary profession in India should consider capacity building to become 'the' new home for the veterinary medicine axis. The country needs to step up and claim this role to underwrite animal production transformation. It is estimated that about 70 million rural households own livestock of one species or the other. Women constitute about 69% of workforce engaged in livestock sector. The resource-poor small and marginal farmers and landless labourers own majority of the livestock resources. Hence sustainable development of the livestock sector would lead to more inclusive development and empowerment of women (National Livestock Policy 2013) and make rural economy drought resistant. The 80% drought prone Indian agriculture land and rural welfare (ICAR 2011) implore veterinary professions' contributions. Internal debate should empower this movement in terms of professional abilities and spirit.

Veterinary profession and human medicine diverged around 1950–1960 significantly when human medicine stepped up to claim research and development role, and invested in specialty areas. Veterinary profession missed that opportunity due to society perception limitations and lack of visionary leadership. Another opportunity beckons

us now, mostly due to current challenges in society that fall under veterinary subject area(s) of specialty. Reform of veterinary profession is essential for (a) manpower reconciliation, (b) backyard to farm management transformation, (c) reconciling accurate disease map with prevention and control and d) contribute to expanded subject areas. India should not emulate west and seek a customized model of veterinary infrastructure to maximize expanded role outcomes and increase poverty alleviation contributions. India already possesses several components in place for a customized model, which can benefit from planned capacity building.

Veterinary profession manpower perspective

Agrawal *et al.* (2013) analyzed manpower requirements for animal sciences in their publication in the Journal of Animal Sciences. Their manpower forecast for 2020, showed a gap of 60% undergraduates, 49% postgraduates, 63.3% PhD, and 78.7% diploma holders (veterinary paraprofessionals). Contrary to this, Sashidar and Reddy (2013) reported post-graduate veterinarian surplus scenario. Demand predictions in India have severe recruitment pace limitations as the public sector is the primary employment sector. Unfilled and unexplored opportunities due to administrative apathy can throw predictions off balance. USA had similar demand forecast that did not turn out to be true. Within 2 years after the forecast, and accreditation of foreign schools with enormous graduate output capacity (one school has 2–3 times more than US norm), majority

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opinion was contradicting increased demand in manpower needs. It is worth to note here that a much more pragmatic route to increasing numbers significantly either for veterinarians or paraprofessionals is needed. Profession needs to first invest in creating opportunities before enormously increasing the number of graduates. If the profession would like to have surplus graduates for possible future need, then the curriculum should empower them to become independent entrepreneurs and survive in market place. Government is encouraging the private industry role in small animal industry that could provide additional opportunities for self-employment. Much more proactive efforts initiated by Department of Animal Husbandry, Dairying & Fisheries (DAHDF) in terms of professional skill empowerment through central and state veterinary council bodies will soon enhance commercial livestock production opportunities. Aligning skill development objectives and national goals requires much more proactive internal discussion within the profession and among the stakeholders.

Agrawal *et al.* (2013) presented substantive data that establishes disparity in investments for animal production sector capacity building as well as research and development to a level that quality of the graduates is going down when we need the most. Share of livestock in the agricultural GDP improved consistently from 15% in 1981–82 to 26% in 2010–11, and this provided a cushion to overall agricultural growth. Sixty three percent of rural men and 79 percent rural women workforce is engaged in agriculture (GoI 2011). Furthermore, animal husbandry activity engages household members year long. Trained veterinary graduates and para-vets are key to enabling rural women to become livestock entrepreneurs.

However, the manpower projections in above publication were based on current model of profession. Here we propose changes to profession in curriculum, training, and research to maximize personal achievements as well as society contributions. Women empowerment and rapid poverty alleviation needs, implore us to rectify the capacity building needs as soon as possible and facilitate more aggressive rural welfare contributions.

Controlling research and education separately by ICAR and Veterinary Council of India would be detrimental to the self-regulation of veterinary profession. Furthermore, veterinary medicine role is not limited to agriculture only but involves human medicine and basic science. The veterinary profession growth should span agriculture, human medicine and basic science but never could develop consensus on full scope of the profession and investment needs. It is also true that none of the veterinary profession torch bearers could carve a separate sphere overshadowing all three interdisciplinary specialties under its purview. Veterinarians' destiny will not be realized without proportional funding to its contributions. While individually it plays secondary role in each field, together its contributions would outperform. Its undeniable tugboat role in translating basic science findings into biology

applications is still underexploited. Sustainable agriculture model also requires much more investments to reduce dependence on chemicals using organic fertilization, and become drought resistant rural economy by virtue of daily supplemental income.

Our article would not recommend a change in the total man power projections as presented by Agrawal *et al.* (2013), but reports that assignment requirements may vary and should precede enhancement in opportunities. For example, we believe that farm management would reduce the individual animal based symptomatic approach thus reducing the intervention intensity. Current output of the professionals should only be aimed at replenishing retirement forecasts. Reform of the profession expanded roles should precede plans to increase output. If there is one thing that profession all over the world has done successfully, it is the veterinarian's job and financial security in the area of their specialty. It would defeat their perseverance, if we fail in our forecast and unemployed veterinarians are on the street trying to earn a living in non-professional jobs. Therefore, State governments should forecast their needs and together with central government needs the total number of professional and paraprofessionals should be calibrated.

Veterinarian role in India vis-a-vis USA

Understanding western and eastern experience would empower the reform process. The United States of America has established many precedents in raising the bar in veterinary profession. It has decades of advantage in most fields and veterinary education is no exception. Understanding USA experience in veterinary education and exploring how it relates to India would empower this review process. As a developed nation, they have a broader analysis opportunity of outcomes after years of regulation that would teach all about successful areas and missed opportunities. Exploitation of such information could stop India from reinventing the 'past'.

US maximized their investments in farm management and pet industry for long that reflects in their accreditation procedure. It does not provide emphasis on livestock clinical diagnosis and treatment on an individual basis but follows protocols for a farm based approach. At the same time, pet industry and equine medicine are dealt with at an individual level. Laboratory diagnosis is invested in and prevention/control methods are mostly followed like scriptures. Prototype farm environment is accessible to students on the campus in the areas of bovine, and equine. Minimum number of cases used in training students on campus is also regulated. Emergency and critical care is much more strengthened on campus for training veterinary students. Laboratory animal medicine and exotic medicine are taught courses unlike in Indian schools. In general, guidelines are broad for curriculum expectations and syllabi are at college discretion- so that innovation and academic freedom are not curtailed. The rigor of training is tested with a common standards evaluation examination and skillset certification

required for a newly graduated veterinarian. The recent graduate experiences are assimilated to revise the skillset expectation list to be implemented for current batch of students. Continuing education (CE) needs of licensed veterinarians are addressed by the state licensing body implemented mandatory CE regimen. State would make 2 h regulatory compliance CE a compulsory in a total of 15–20 h of CE offered locally or during conferences/symposiums all duly vetted for quality and content suitability. State license procedures vary and are customized to their needs and there is no national license to practice in USA. Universities are not regulated under veterinary practice law and are free to self-regulate. Foreign veterinarians are offered screening examinations that include a 4 step process that includes English language. Research contributions on campus and research training opportunities for students are also part of minimum standards regulation. The entire process of minimum standards regulation is reviewed once in 7 years (American Veterinary Medical Association).

So far, in USA, the animal production industry is performing well. USA, though seventh in dairy cow population in the world is holding first place in milk production (FAO stat 2012). While India has 16.4% versus USA 3.4% of world cow population, India produces only 8.4% while USA contributes 14.6% to world milk production (FAO stat 2012). The United States is the world's largest poultry producer and the second-largest egg producer and exporter of poultry meat. With the world's largest fed-cattle industry, the United States is also the world's largest producer of beef—primarily high-quality, grain-fed beef for domestic and export use. USA is the second largest producer of pork. Only sheep production is declining consistently due to lack of demand (United States Department of Agriculture- USDA). The technology and genetic potential exploitation is best in the world even though accreditation process might have limited role in it, with private industry claiming all the praise. Expanded role of veterinary profession remains an area that west miscalculated in their accreditation process. USA by definition does not emphasize expanded roles in animal husbandry; hence encroachment in dairy, poultry, piggery, fisheries, animal nutrition, and meat industry has become a norm. Lack of visionary leadership handicapped veterinarian roles in public health, pharmacology/toxicology, bioterrorism, basic science research and drug development areas.

Delegating para-veterinary professional fields to others similar to human medicine was a bad idea as the society perception limits the pay and opportunity scope for veterinarians. Human medicine has delegated many unwanted fields as there was sufficient growth requirement and resources did not have a limit. Perception of society on veterinary profession will not see better days without prototype evidence based empowerment. Initiative is suffering lack luster participation in society challenges and opportunities. Human medicine married research potential

wherever it could find, to maximize growth whereas veterinary medicine became obsessed with self-limiting approach in USA. Veterinary profession's underperformed and/or abandoned society roles include drug development, animal welfare, farmer welfare, zoonotic control, and poverty alleviation. Basic scientists are ineligible to run human clinical trials whereas they manage animal preclinical and clinical trials in USA. The animal clinical trials have a very inefficient scrutiny hence most promising preclinical animal data is of low quality stretching human clinical resources and budget requirements.

Remedial and periodical rededication efforts require veterinary professional leadership that is democratic and facilitates exploitation of available talent and opportunities. USA is still working on making American Veterinary Medical Association democratic and solve professional logjam. The members are aware of the situation but are unable to bring reform as they are sidelined by restrictive rules. Animal research dollars are not awarded to veterinarians like human research dollars are awarded to physicians and the disparity is untenable. Similar disparity exists in livestock sector even though its contributions are increasing in agriculture. Basic science does not depend on *in vivo* validations in a multidisciplinary, immune competent, genetically diverse background similar to target population. Cell culture has been labeled as *in vivo* even though it is not.

United Kingdom that follows Europe regulations also is centrally administered by Royal College of Veterinary Surgeons (Royal College of Veterinary Surgeons). Regional control like in USA does not exist and may be a model that suits India. However, India is vast and decentralization may be a better option, with more participatory involvement of states. In general, UK regulatory framework is similar to USA with minor variations in centrally administrated oversight.

India has been investing in crossbreeding and symptomatic treatment of individual large animals since independence. Capacity building results are in line with this government priority. Poultry industry growth and dairy milk production success in India were initiated and nurtured by private and autonomous organizations, respectively. Diagnosis and prevention/control measures are incomplete and inefficient. Pet industry is far behind to west and import dependent. Support services for buffalo industry and sheep/goat industry are predominantly negligible. In research and development, veterinary profession has an opportunity to right the wrongs of western model- in raising the bar in animal clinical trials for better animal and human drug development. It can also establish itself as the unbiased bridge between bench (laboratory) to bedside (human hospital).

Prototype farm environment on college campus or nearby, have opportunities for improvement. Case load for large animal treatment on individual basis is sufficient whereas pet clinical exposure is insufficient in most colleges. Minimum number of cases used in training

students on campus is also regulated but importance of diagnosis is undermined. Emergency and critical care is insufficient in most colleges. Laboratory animal medicine is not a course, hence, drug development and animal model development contributions are less developed. In general, guidelines are rigid hence innovation and academic freedom in education is curtailed. Common standards examination is absent while rigid curriculum and syllabi are safeguards for common standards. Continuing education requirements for licensed veterinarians are not present in all states, and district administration is left to deal with it on 'as needed' basis. Research contributions on campus and research training opportunities for students are not part of minimum standards regulation. The entire process of minimum standards regulation is reviewed periodically. However, research training, post-graduate research and academic research funding resources under the ICAR control limit the scope of self-regulation philosophy.

On a positive note- veterinarian belongs to a community that has been working with poor animal production farmers – serving them free of cost to tide through animal health problems. Professional training of veterinarians in livestock disease management is much better in India than west but absence of laboratory diagnosis regimen is compromising outcomes. India, unlike west has stable academic environment with best talent retained in Universities and contrarily best talent is predominantly in private practice in the west. Many opportunities still exist in India for maximizing contributions and reaping the benefits from this profession.

A number of milk and poultry industries show a success story. However, Vision 2030 ICAR forecast (ICAR 2011) presented a much more challenging period ahead in terms of animal production demands. Furthermore, poultry farmers are becoming contract labourers instead of entrepreneurs and dairy would follow suit if rural poor farmers continue to lack support they need. USA poultry farmers are already suffering enormously under big business contract stipulations and subjugation (Constance *et al.* 2013). Furthermore, free-fodder schemes are sold as drought relief tools but the essential component 'animal production' continues to be underexploited in rural poverty alleviation.

Other controversies include- unsupported buffalo milk production is surpassing the cow milk production; crossbreeding virtues are called into question; untenable disease load; technology and genetic potential exploitation is very inefficient at best; expanded role of veterinary profession is an area that India is not thinking as it is eager to follow the west.

Historical investments in crossbreeding have a controversial legacy in India. Crossbreeding is blamed for disintegrating the disease resistant, environmentally suitable indigenous breeds (National Livestock Policy 2013). Situation in genetic potential needs is so bad that we do not have sufficient semen production capacity to provide service to all the farmers. Furthermore, crossbreeding program has distracted us from improving the performance parameters

of indigenous breeds. Now, realizing their importance- Planning Commission in their 12th Five Year Plan has allocated significant resources for conservation of elite indigenous breeds, improving the production performance, and disease prevention and control. As 75% of livestock is from drought prone areas (National Livestock Policy 2013), government invested in feed and fodder development initiative also. Genetic potential exploitation and technology exploitation are under-serving the society needs and poverty alleviation goals. Nation is yet to exploit biotechnology potential for production efficiency, genetic pool transformation, animal welfare as well as poverty alleviation.

Changing role of veterinarian as defined by current challenges

Reconciling animal production forecasted growth with capacity building: The per capita availability of milk in the country which was 130 g/day during 1950–51 has increased to 322 g/day in 2014–15 as against the world average of 293.7 g/day during 2013 (Department of Animal Husbandry, Dairying and Fisheries). Opportunities exist in growth of dairy milk, eggs, and meat products as demand is growing with economic growth. Necessities like child nutrition, balanced nutrition in rural areas, and food processing transformation ensure livestock production growth. However, it is better if the government ensures animal production benefits stay with rural poor. Otherwise, they will be evicted from their last bastion of economic safety. Corporate interests would trample on rural welfare if policy and facilitation are misguided. How we ensure food security in animal products does matter for poverty alleviation, social stability and inclusive growth. Poultry is an enviable industry that saw spectacular growth but did not help proportional farmers to become entrepreneurs. Capacity building in animal production growth should facilitate farmers to become entrepreneurs. The symptomatic treatment of individual animals should be limited to pets not for livestock production. The effort on such clinical diagnosis based (instead of laboratory diagnosis) therapy should be limited to 25% of the public funded veterinarian's job description. The remaining 75% effort should be distributed between disease prevention, farm management support, targeted poverty alleviation through animal production and entrepreneurship training to backyard farmers and rural youth. Sixty-nine percent of women benefactors of animal production (National Livestock Policy 2013) need our sincere efforts in providing equal footing for poor farmers to compete with big businesses. Capacity building needs of such realignment of effort from public funded veterinary infrastructure include continuing education for veterinarians and para-professionals, changes in expendable and non-expendable priorities, training course facilities and expansion of extension reach. Reforms should be made to veterinary and para-professional curriculum to align graduate skills with society needs. Current investments in rural welfare are predominantly handouts and are poorly

monitored for outcomes. Increasing public funded veterinary infrastructure contributions is a justified investment to meet both state and central government objectives in the interest of social stability and inclusive growth. Investments in veterinary education are low and its growth is pegged at 4%. The veterinary education activity growth is reported to be less than agriculture or any other professions in spite of better contributions (Agrawal *et al.* 2013). It also requires integrated approach to execute government welfare and growth plans. The current model of independent plan implementation is outdated and information technology and virtual world can make integration of execution not only feasible but prompt and economical. Subject area specialty needs can be addressed with cross fertilization and prompting on a smartphone or an ipod.

Disease map challenges: Animal health vaccine and medicine market stands at ₹ 1,700 crore, food market at ₹ 8,000 crore and nutritional products at ₹ 700 crore (NIABI 2012) all of which depend on good diagnostic infrastructure. Diagnostic infrastructure is essential to monitor and plan remedial measures. World diagnostics market stands at 2 billion dollars. Indian companies' veterinary diagnostics market share at the moment is negligible. Veterinary health is mostly directed at curative products rather than diagnostics/prevention. Furthermore, country is not self-sufficient in its vaccine needs. Nation is facing rabies vaccine shortage and is only a tip of an iceberg. India stands at 2% of the world animal health market (NIABI 2012) in spite of (a) one billion population, (b) inexpensive skilled work force, (c) relatively less infrastructure costs, and (d) growing demand for animal products. India is home to 18% of dairy, 12% of sheep and goat, 10% of broilers and 8% pets of the world animal population (NIABI 2012) and deserves better diagnostic and prevention infrastructure. Improvements in animal health will reduce imports, ensure food security and reduce food grain demand. It would also maximize export potential.

Animal production sector is doing much better than agriculture in terms of growth. As a kilogram of meat production takes minimum of 2 times more grains, animal production performance has to be better to keep inflation down. Disease load burdens the poor livestock farmers disproportionately exposing social stability to risk. Even a lesser percentage of losses could destroy rural poor economic security due to inefficient biosecurity infrastructure. In the absence of diagnosis based prevention and control planning, most of the emerging diseases will get opportunity to become epidemic and endemic contributing to quagmire of Indian disease load. Such fallout would also haunt human zoonotic disease and bioterrorism scenario. Current symptomatic treatment approach limits the outcomes from policy, planning, vaccine regulation and vaccination contributions. Diagnosis investments can be increased by required awareness campaign among the stakeholders. Unlike preventative measures, curative options can never expect resolution but perpetuates disease load. Central

diagnostic lab services are fundamental to preventative planning based on pathogen and their strain identification.

Assurance of standard of care and service

Veterinary practice regulation is warranted to ensure standard of care and safeguard veterinarian's interests. Regulation in some instances can become a hurdle to client satisfaction. Hence, it needs to be consensus based and be incremental in rigor. Pacing the regulatory framework would limit controversies and provide an opportunity to serve both sides of service industry fairly. Regulating the extensive government funded infrastructure, veterinarians do not have precedence to learn from as such public funded veterinarians do not exist in regulation prevalent west. India needs to create a best framework for state employee license regulation for other developing countries to follow.

Veterinary research contributions

Veterinary colleges should develop networking in prototype empowerment projects to highlight and establish profession expanded roles. Evidence based empowerment is the only way veterinary profession can contribute to following areas of importance in current affairs: (i) One medicine One health, (ii) Sustainable rural welfare and growth, and (iii) Integrated extension services for simple inexpensive rural welfare. The publication barrage with no impact should be curtailed in India to save money and increase outcomes. Biology publications in the west have become entrapped with low quality multidisciplinary *in vivo* validations that reek of conflict of interest opinions. Unbiased veterinary research institutions should validate promising basic science bench work findings before they can attract huge investments in translational research. Prototype illustrations will enhance society investments in the profession. Funding parity based on contributions profile and subject area specialty responsibilities should be represented in a cohesive way with message discipline.

Suggested changes in veterinary education

Reforming the curriculum aligns knowledge and training with opportunities. It would also assist in translating the knowledge and training into ability in real world. Opportunities are dynamic and require periodical curriculum reform. Animal production, disease load scenario, animal welfare, pet care, societal roles and poverty alleviation needs warrant a broader discussion on required changes in education. Delayed progress compared to west in India has provided many second chances to veterinary profession. Some areas have advantages of 20/20 hind vision that need to be exploited to India's advantage. Areas that need educational reform are as follows:

(a) Indian current animal production necessities require education and training to empower student to upgrade backyard farming into farm management of different sizes. Livestock production management facilities should provide students access to small, medium, and large prototype farms with complete records to empower their learning

experience. A comparison of how each size of operation influences the farmer family choices and outcomes would imbibe greater expectations for students to follow. It will facilitate student capacity to enroll small and marginal farmers to become entrepreneurs.

The team taught course with experts from multiple disciplines involved should teach India specific ground realities and best course of action for transforming the backyard farming to farm management. It would be the best skillset India needs to increase agriculture GDP. Farm-growth poverty reduction coefficient in China in 2008 was 3.5 times and in Latin America it is 2.7 times (Gupta 2015). Animal production growth poverty reduction coefficient would do better. As mentioned earlier, 69% of livestock participants are women (National Livestock Policy 2013) and women welfare is central to a sustainable model of family and society development. Colleges should impart skillsets training, ideology, self-confidence, and audacity to seek greater role in society. What better way than investing in an illustrative experience. The problems in governance and execution would find simpler solutions when youngsters find a seat in problem solving.

Antibiotic use in animal production needs to be regulated and alternative environmentally friendly Ayurvedic/herbal trials need to protect production performance. The antibiotic resistance could cause more damage in India as the diagnostic infrastructure is not yet GLP compliant. Students need to be aware of their role in reconciling production performance with that of multi drug resistance in the society.

Reproduction manipulation is underexploited and livestock production management should develop SOP procedures that can be implemented among small cohorts to extort better outcomes. Students should be enrolled in a national mission of saving resources and increasing production that would help rural poor family in a transformational way. They need to have exposure to real life practical examples of challenges and success by integrating NSS/extension training enumerated below.

(b) Livestock production technology has always provided avenues for large scale operations. As much as the small and marginal livestock production operations are abundant and face support services problems- it makes more sense to customize technology to suit their scale. World is changing at rapid pace and miniaturization of established technology options are feasible and necessary. It applies to slaughterhouse facilities also. Only then the animal production poverty alleviation role will find equal footing in competitive market. Livestock production technology should have an active branch of research and development to customize technology to suit different size livestock production operations. Teachings should encourage awareness in technology role in animal production and participatory innovation responsibilities of veterinary profession. Research opportunities should encourage active collaboration between veterinary students and technology engineers.

(c) *Diagnosis/prevention/control*: Special emphasis on

current symptomatic treatment predominance and associated detrimental efforts should also be taught in the interest of food security and poverty alleviation. Country has an official version and an unofficial version in disease load. World does not believe in our disease load statements and poor farmers are the victims of this underreporting norm. Current disease map comparison shows USA suffering more emerging diseases than India. It shows their disease monitoring efficiency and our 'Chalega' attitude. Ensuring food security, zoonotic diseases control, food safety, agriculture economic growth and our reputation as best foreign investment/travel destination depends on facing this problem head on. The apathy has gotten so bad that field strains and vaccine strains compatibility monitoring does not appear to be in the pipeline. Diagnostic kits are imported and are developed against foreign strains. We depend on them to declare our disease load making the data not so sacrosanct. Zoonotic disease management in a highly populated India in terms of both animals and humans compounded by enhanced travel network is a challenge. Veterinary students and field veterinarians (CE) should be enrolled to expand the reach of necessary reform. The effects of our ill-advised practices on rural farmer family with children need to be explained to show the relevance of what we do to welfare.

They need to be trained to implement necessary changes and become spokes persons for the cause. Mandatory CE classes need consensus among the practicing veterinarians.

(d) *Animal welfare*: India has impeccable heritage in animal rights and it should be taught to veterinary students. We need to formulate animal welfare compliant milk and meat production practices and enable veterinarians to be the torch bearers of animal rights. We need to campaign for integration of spay/neuter program with animal husbandry department responsibilities. For this, we need veterinary students to become comfortable in spay/neuter skills. We should work with industry to make best practices popular and acceptable with public opinion support. How we treat animals even those meant for work, or meat defines who we are. Profession should be able to showcase the history and current practices that are superior to west. India provides more boarding space to pets than USA and our animal experimentation is far more restrictive than the west. In addition, poverty alleviation through animal production would benefit from advertising better animal welfare conditions in small farmers premises. Handling meat with machines (practiced by big businesses), that weigh tons is unpalatable and most likely enhances disease incidence in humans. Awareness would increase market access and sale price for small and marginal operations that do not follow such methods. Animal welfare representation could also protect the rural farmers from becoming contract labourer in their own land. Raising meat purpose animals under stressful conditions is inhumane and reprehensible. We need to protect the animal and farmers interest at the same time and make them interdependent.

Government involvement in pet industry should be

minimal like USA and pet industry should be in the private hands. Humane society organizations need to be encouraged for spay/neuter, low cost veterinary services and adoption facilitation.

We need to formulate animal welfare course to address existing challenges and raise animal welfare bar in line with India's heritage, and enhance society contributions.

(e) *Regulatory framework empowerment*: Standard of care needs to be defined to formulate expectations. Even though standard of care principles adhere to local practices and standards, it would help India to have a common standards screening for all the veterinary graduates. Clinical proficiency could be certified during internship by a qualified veterinarian with advanced training. Common standards examination or All India Veterinary Licensing Examination (AIVLE) – a written test, could be a prerequisite for veterinary practice license that is administered centrally to all graduates who seek a license to practice. 75% score is necessary to secure pass and each college should enable 75% students pass the exam to be eligible for accreditation. Relative performance between subject areas and colleges would tag areas for improvement. Computerized AIVLE should be administered by an outside agency with knowledge in the process, using examination centers that are away from the college campuses. Students who pass the AIVLE and Clinical Proficiency Certification would be licensed to practice. In addition, annual 15- 20 hours of continuing education (CE) requirement would address the needs of the individual as well as mandatory regulatory updates to keep professionals trained and ensure standards. Regulatory stuff could be a mandatory component. Any complaints on licensed veterinarians will be heard by rotating peer panel that is randomly selected from the licensed state veterinarians with 5 years prior experience. The board members who contribute to complaints panel is selected by state authorities. Any appeals need to be reviewed by an expert panel consisting of seniors. Appeal process can permit legal representation and veterinarians who feel justice is denied can approach court of law. Board of veterinary licensing regulation, and veterinarians would be better off insured to cover for liabilities.

Regulation of license to practice can victimize veterinarians due to mismanagement as well as misuse, hence implementation needs to address inherent difficulties in favour of veterinarians for some time to come. The regulations can consider incremental rigour with annual reevaluation of fairness to 'client' and 'veterinarian'.

(f) *Human and animal bond*: As India loses its rural combined family ethos, it would need human-animal bond to replace it. Such a pet industry growth is forecasted already. Veterinary profession needs to increase the skills in pet industry for veterinarians similar to west and relieve India from import dependence. Pet industry dependence on imports has to be highlighted clearly to encourage the veterinary students to work on self-sufficiency.

(g) Elective subject course work options should be part

of the course work and can involve individual choice based specialized areas. They need to be in line with expanded role profession seeks.

(h) *Extension/NSS*: Extension and NSS should be combined to provide students an integrated village development experience that would cover all necessities. It should start from first year and each batch of students should be provided with a cluster of villages and each group of students should adopt one poor family for targeted, integrated upliftment covering all their needs for example from education, health, animal production, entrepreneurship, child welfare, and women welfare etc. This group can call in, or reach out, or represent family needs in an outcome oriented manner to transform their life for the better. At the end of 4 years, they would submit a report of their work which will be graded under NSS and extension credit hours. This experience of entire class should be periodically presented and shared to empower their belief in transforming India one family at a time. It would become a source of strength for their entire lifetime of extension work in society. Treatment of animal is only one aspect of rural poor needs. Using integrated approach, one can benefit entire village in 1 visit instead of 10 teams covering 10 areas on 10 days. Once needs are identified, other departments can target them precisely with less budget, speed and accuracy. It would also provide positive publicity for veterinary profession that would have dividends in everything they do.

Curriculum guidelines need to be broad and syllabi should be college prerogative rather than well-defined to permit innovation and academic freedom. It would also foster mutual learning process for dynamic internal reform. A common standards examination administered by VCI should evaluate each college performance and become part of the accreditation performance review. It would relatively evaluate curriculum rigour also. Such a step would enable us sidestep political interference in common standards rigour with outcomes evidence. Standards for faculty recruitment, retention, research facilities, academic freedom and career advancement need to be defined for accreditation process. Clinical competency skillset certification should be part of internship experience and all facilities for skillset training need defined expectations. Research funding control should be with VCI and nation needs to be convinced to stop partial self-regulation of veterinary profession. Research experience for product development and regulatory understanding for submitting regulatory applications could involve both inside as well as outside laboratory as proposed by student and vetted by college.

In the end, we have to realize that no accreditation norms are permanent and VCI should invest in recent graduate feedback after 1st year and second year work experience to be collected by respective colleges and centrally analyzed by VCI. Same method needs to be followed for the common standards examination pattern relevance and outcomes. CE should be made mandatory for field veterinarians and topics should be based on current needs specific to the region.

Regulatory CE should be part of the process (2 credit hours out of 15– 20 total for year) to increase compliance and reform of practices. First among equals in the country can exploit export opportunities within and outside the country.

Execution of veterinary education reform through accreditation oversight

Veterinary education in India is regulated since inception of Indian Veterinary Council Act in 1984. Current Minimum Standards for Veterinary Education (MSVE) seem to prefer enforcing common approach that could curtail innovation and outcomes monitoring opportunities. VCI has an opportunity to improve the MSVE regulations during their ongoing third review. Such a review process should not only consider profession needs but also aspire to contribute to national and social needs. The authors of this article would like to spread awareness on such an approach.

Minimum standards of veterinary education would become a guiding principle for veterinary profession. It forms an accreditation yardstick by which veterinary colleges would be assessed for certification. Hence, MSVE formulation process needs to be rigorous to serve the current needs of the veterinary profession, and to facilitate uniform standards, with unhindered future development peppered with required guidance. It provides veterinary profession an opportunity to maximize animal and human potential. Accreditation bodies have opportunities to align education with society needs. Universities all over the world have a problem in aligning themselves to social responsibility and are considered detached from outside world. The learning curve after leaving college is always steep which could be rectified by aligning education with ability. Poverty alleviation, food security, environmental protection, animal welfare and human-animal bond are illustrations of society needs that need to be facilitated through veterinary profession accreditation process.

Government regulation could maximize animal production role in poverty alleviation

Reconciling animal production industry growth with rural poverty alleviation is crucial in India. As noted before, 69% of the benefactors (National Livestock Policy 2013) of livestock sector are women and without equal footing, big business houses will elbow them out of their last bastion of economic safety. Saving small animal expenditure requires tax free professional services waiver to enable private hospitals survive economically. Such a provision does exist in USA. Regulation framework has options in facilitating local marketing, fresh versus shipped, family owned against

corporate owned, hand processed versus machine processed advertisement campaign. Capped profits policy is an optional reform that can help in industry stability.

Department of Animal Husbandry, Dairying & Fisheries is becoming proactive to address the long standing problems in livestock production and pet care. However, there are no developed country's models for India to follow in ensuring benefits stay with small and marginal livestock farmers. Ensuring outcomes by vigorous monitoring and timely resolutions, we can reconcile livestock production growth with rural welfare. Expanded roles require consensus among the stakeholders cultivated with irrefutable prototype evidentiary data. The authors hope awareness brought forward to elevate discussion on veterinary profession opportunities would be beneficial to the profession as well as to the society.

REFERENCES

- Agrawal R, Rao D R, Rao B V L N, Nanda S K and Kumar I. 2013. Forecasting manpower requirement in Indian Veterinary and Animal Husbandry sector. *Indian Journal of Animal Sciences* **83**:667–72.
- Department of Animal Husbandry, Dairying & Fisheries (DAHDF) at <http://dahd.nic.in/about-us/divisions/national-livestock-mission>.
- FAO stat. 2012. <http://faostat3.fao.org>. (Accessed on 5 February 2016).
- Government of India. 2011. Key indicators of employment and unemployment in India 2009–10, NSS 66th Round (July 2009 to June 2010), National Statistical Office, National Sample Survey Office, Ministry of Statistics and Programme Implementation, Govt. of India, New Delhi.
- Gupta Sekhar. 2015. Why rural India matters: Agriculture's share in economic GDP may be low but in electoral, political equivalent of GDP, it is about 60%. *India Today*, June 5th.
- ICAR. 2011. *Vision 2030*. <http://www.icar.org.in/files/ICAR-Vision-2030.pdf> (Accessed on 9 December 2015).
- National Livestock Policy. 2013. Ministry of Agriculture Department of Animal Husbandry, Dairying & Fisheries, Government of India (Accessed on 5 February 2016).
- NIABI. 2012. Animal health in India SME business opportunities. <http://www.slideshare.net/abi-icrisat/mr-kv-balasubramaniam> (Accessed on 9 December 2015).
- Royal College of Veterinary Surgeons. www.rcvs.org.uk (Accessed on 5 February 2016).
- Sasidhar P V and Reddy P G. 2014. A quantitative analysis of the supply and demand of veterinary manpower in India: implications for policy decisions. *Revue Scientifique et Technique* **32**:639–44.
- Twelfth Five Year Plan. 2012–2017. *Economic Sectors, Volume II, Planning Commission*. Government of India. www.usda.gov/wps/portal/usda/usdahome. United States Department of Agriculture. (Accessed on 5 February 2016).