

HUMAN RESOURCE NEEDS IN VETERINARY AND ANIMAL SCIENCES



NATIONAL ACADEMY OF VETERINARY SCIENCES (INDIA)

G-4, A-Block, NASC, Dev Prakash Shastri Marg, New Delhi-110 012

August, 2015

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“To consolidate and promote the views of scientific community on all policy matters related to Veterinary Science and Animal Husbandry in the welfare of India; to encourage better training and utilization of veterinary talent and enterprise in the country; to strive for advancement of livestock sector in the national economy; to promote animal welfare; to protect environment; and to safeguard the interests of the profession and to gain greater recognition and acclaim for it”.

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PREFACE

Looking to the economic importance of animal husbandry sector to the national economy, it is very important to oversee human capital situation required to support it. In the present policy paper, attempt has been made to realise human resource needs in the field of veterinary and animal sciences.

In this policy paper, focus has been on veterinary graduates and specialised HR in veterinary and animal sciences. The paper provides an insight on the present status of installed capacity and future requirements. It is expected that this policy paper shall serve as an important reference to policy makers and professional leaders, leading to strategic planning to meet future requirements.

Although, authors are conscious of the fact that this is a very important human capital contributing to the sustainability of the sector, yet, there are certain other lower as well as collateral segments of human capital required, which needs a separate assessment and therefore has been kept out of the scope of this paper.

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FOREWORD

I am immensely pleased to present this Policy Paper on 'Human Resource Needs in Veterinary and Animal Sciences' as an official publication of the National Academy of Veterinary Sciences (India). It has critically examined India's human resource needs of veterinary profession so as to highlight the acute shortage that exists in various areas and to offer pragmatic suggestions to eliminate these deficiencies for achieving the short-term and long-term goals of developing the Livestock Sector. I am confident that this booklet will be useful in addressing the human resource needs of developing the Livestock Agricultural Sector of our national economy.

I sincerely thank and compliment the Convener, Co-Convener, Reviewers and the Editor for compiling and editing the manuscript in excellent manner.

Prof. Dr. K.M.L. Pathak,
President, NAVS (India) and
Deputy Director General (Animal Sciences),
Indian Council of Veterinary Research, New Delhi

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Human Resource needs in Veterinary and Animal Sciences

1. Prologue

The highly specialized livestock sector, including poultry and fisheries, involves multifarious tasks for the professionals in veterinary and animal sciences in the broad areas of health care, breeding, feeding and management of animals for sustained livestock production, value addition and quality assurance of livestock (LS) products for internal consumption and to boost export potential from livestock. Public health concerns, food and nutritional security, sanitary and phyto-sanitary (SPS) concerns, environmental issues, animal welfare and ethics, and addressing the concerns of trans-boundary diseases are also part of other major responsibilities of a veterinarian. Adequate and competent scientific cadre possessing requisite knowledge, skill and attitude (KSA) to manage teaching, research and transfer of technological practices are basic necessities to develop human resource for the delivery of effective and efficient services.

India has the distinction of having very large livestock population in the world (512.05 million as per 2012 Census). According to the 2012-13 report of the Department of Animal Husbandry, Dairying & Fisheries (DAHD&F), GoI, a sum of Rs. 5375 billion (Rs. 5,37,535 crore) accounting for 4.11% of the national GDP and 25.63% of the value of output from agriculture and allied sectors at current prices are generated through animal husbandry practices. Milk alone contributes 66% of the total output and the rest comes from meat, eggs, wool and other products. The progressive increase in the output of milk, meat, eggs, and fish has resulted into improvisation of per-capita consumption of these commodities thereby exhibiting a positive sign for ensuring nutritional security of masses.

Though India stands first in milk production (134 million tons during 2012-13) in the world and there has been quantum increase of 6-7 times in the last 4 decades, yet low average productivity of our livestock is a cause of concern. Growth in LS production is demand driven and is rising at a steady pace. Increased LS production has helped in raising the income of middle class rural households. There has been greater awareness towards consumption of quality animal origin proteins leading to the steadily changing food habits of people both in rural and urban populations. Thus, with increased availability, utilization of food from animal origin is on the rise. However, in India, there is still a wide gap between the availability of quality food and feed and the biological needs of the same for man and animals, respectively.

Livestock sector is and shall continue to be an important segment for augmenting our agricultural growth. During the period between 1970 and 2013, the growth rate in agriculture as a whole has been less than 3%, while the same in livestock sector was around 4% as compared to 2.7% in crop agriculture. Thus the higher growth rate in LS sector has acted as a cushion to push up the agricultural GDP as a whole. The central and state governments thus ought to accord much needed priority for boosting livestock, poultry and fisheries production and productivity.

The role of veterinarians and animal scientists is becoming more and more challenging owing to diversification in livestock sector; higher expectations of industry, farmers and entrepreneurs; diminishing land under fodder production and for pasture, besides the challenges posed by climate change threat. In the present scenario, we need to produce more with fewer resources. It is a hard fact that in order to be sustainable in agriculture, livestock sector is considered to be the most dependable avocation for rural households. This sector needs to expand exponentially so that it is better equipped to share the burden in societal built up through veterinary and animal husbandry

enterprise and practices. Creation of more institutions with modern infrastructure facilities matching global standards to expeditiously produce competent human capital with appropriate knowledge, skill and attitude to effectively manage different activities is need of the time. Human capital is the most crucial component of growth and thus requires appropriate strategies for human resource development (HRD) and human resource management (HRM) programs.

2. HRD setup for Veterinary and Animal Science Education, Research, Extension System and LS Management

2.1. Academic Institutions

2.1.1 Veterinary and Animal Sciences Universities

Presently there are 13 State Veterinary Universities (SVUs) besides the two national research institutes of the Indian Council of Agricultural Research (ICAR) having the status of Deemed Universities (DUs). Among these, Indian Veterinary Research Institute (IVRI) offers postgraduate (PG) education in veterinary and animal sciences while National Dairy Research Institute (NDRI) offers UG and PG education in the disciplines of Dairy Science & Technologies. The list of veterinary/animal science universities in chronological order of their establishment is given at **Annexure I**.

2.1.2 Veterinary Colleges

Presently there are 58 veterinary colleges in the country of which 47 are the constituent colleges of SAUs/ SVUs and the remaining 11 are affiliated colleges. Amongst the 11 affiliated colleges, the one at Puducherry (i.e. Government Veterinary College, Pondicherry) is affiliated to Pondicherry University, while the remaining 10 are private sector colleges are affiliated to SVUs. In fact, till date some 40 colleges are enlisted in the First schedule of the Indian Veterinary Council Act 1984 (IVC Act 1984). The B.V.Sc. & A.H. degree course offered by the private colleges and some of the constituent colleges are yet to be granted recognition by the Veterinary Council of India (VCI), and thus do not figure in the First schedule of IVC Act 1984. The following table details the distribution of veterinary colleges:

Table 1: Status of Veterinary Colleges

a. Constituent Colleges attached to SVUs/ SAUs/ CAUs	No.
State Veterinary Universities (SVU)	30
State Agricultural Universities (SAU)	16
Central Agricultural University (CAU)	01
<i>Total Constituent Colleges</i>	47
b. Affiliated Colleges (Govt./Private) attached to SVUs/Other University	
Private Veterinary Colleges (SVUs)	10
Govt. Veterinary College (Pondicherry University)	01
<i>Total Affiliated Colleges</i>	11
Total : a + b	58

In addition, some Agricultural colleges of SAUs and many agricultural/ dairy colleges under private sector are offering Master's and Doctorate programs by different nomenclatures in animal/ dairy husbandry/ sciences. It is a cause of concern that there is hardly any accreditation or quality assurance norms for these private institutional programs.

Besides these, there are hundreds of Lower education schools/ institutes/ polytechnics in some states offering diploma/ certificate courses to produce Para-Professionals in livestock and dairy sector. Maharashtra alone has 97 schools while Rajasthan has 65 such institutes and Andhra Pradesh (Undivided) has 8 polytechnics. There is wide variability between the numbers of such schools, academic regulations, and entry level qualification and governance system of managing these schools / institutes. Though this policy document is restricted to HRD in higher education but it is also necessary to exhibit concern on over production of Para-veterinarians (Para-vets) with sub-optimal training which would be detrimental to the profession at large. It is feared that at times there could be unhealthy competitions with degree holders in delivery of professional services which do not fall within job pursuits of Para-vets. Hence, a definite policy in this direction is called for.

2.1.3 ICAR Institutes

ICAR is basically a research based organization with the primary mandate to develop and disseminate technologies for development of agriculture and allied disciplines, besides planning, promotion, co-ordination of educational and scientific organizations. Two of its national institutes related to livestock sector (IVRI and NDRI) have been granted 'Deemed to be University' status by the UGC. Both these institutes are undertaking educational programs in livestock sector. For Fishery education, ICAR has a national institute, namely Central Institute of Fishery Education (CIFE) having DU status.

2.1.4 Service Sector Institutions

For the delivery of veterinary and allied services to the livestock keepers and other stakeholders, sizable infrastructure is available in the country as given in the table below:

Table 2. Service Sector Veterinary Institutions*

Name of the Institution	No.
Veterinary Hospitals / Polyclinics	10,217
Veterinary Dispensaries	22,717
Veterinary Aid Centers & Mobile Dispensaries	24,794
A.I. centres	77,765
Frozen Semen Banks	191
Semen Production Centres	54
ICD Projects	98
Liquid Nitrogen Plants	83

Registered Slaughter Houses	2,294
Organized DCS	1,48,965
Total	2,87,178

*Source: Annual Report (2014) DAHD&F, GoI, New Delhi

Besides these, there are large numbers of Live-stock farms (194 cattle and buffalo breeding farms), 4355 Goshalas, 82 Fodder seed production farms, Biological Products Units/Labs, Animal Health Institutes, Training Centers and Diagnostic labs in different States and Union Territories (UTs) of the country.

2.2 Manpower Status

To manage all the aforesaid existing institutions numbering over 3,00,000 (three Lakh), presently there are around 34,500 veterinarians as against the requirement of 75,000 on the modest scale. Further, besides the veterinarians serving in health coverage programs, there are about 2,500 serving in other organizations for managing livestock and poultry farms, defense services, banking, insurance, pharmaceuticals, immuno-biological units, feed industries etc. At present around 3,050 professionals are engaged in teaching institutions, research organizations and extension centers. Literally, there is a shortfall of around 50% in field services as well as at teaching institutions as per VCI norms. It calls for immediate contingency measures to cover up this gap. Under the fast changing world order and expansion of veterinary and animal science in multi dimensions, the demand for competent human capital is on the rise. From a very rough estimate, India will require from 1-1.25 lakh professionals in veterinary, animal science and dairying in the next 20 years (Table-4). It is feared that if the present situation is allowed to continue, the gap will reach to critically low level i.e. from 50% at this stage to 30-35% by 2035.

Table 3 reflects the availability of Human resource in veterinary and animal sciences in the country.

Table 3. Available manpower in livestock sector in India

Nature of job performed	No.
Field Veterinarians (including private practitioners)	34,500
Teaching & Research	3,050
ICAR and other scientific organizations	2,850
Poultry Sector	2,050*
Pharmaceuticals	250*
Feed Industries	200*
Zoo and Wild animals	50*
Livestock Farms	500*
Banking and Insurance	100*
Defense establishment	400*

* *Approximate No.*

2.3 Annual HRD output

Presently, around 35-40 veterinary colleges are regularly producing graduates, and no admissions are being made in the remaining 10-15 veterinary colleges. Taking on an average 60 intake capacities in most of the colleges, though some colleges are admitting from 30-50 students, the annual output would come closer to 2400 mark. Thus, at present, veterinary and animal science colleges/institutions of the Country are producing around 2,400 specialized human resources including graduates, post graduates and doctorates as given in table 4:

Table 4: Human Resource produced in India

Degree	No.
Graduates	2,400*
Post Graduates (out of graduates only, therefore, are not counted extra)	995*
Doctorates (out of post graduates only, therefore, are not counted extra)	150*
Total	2,400

* *Approximate No.*

In addition, there is large scale production of Diploma holders and Para-Professionals, especially from Maharashtra and Rajasthan, whereas there is shortage of para-vets in south Indian states (Rao et al., 2011).

2.4 Livestock Resources & Manpower Requirement

2.4.1 Livestock population

According to the 19th Livestock census-2012, the total livestock population of India is 512.05 million besides about 729.2 million poultry. Out of this population, large ruminants account for 58.56% (299.9 million) while small ruminant constitute around 39.1% (200.22 million) of the total livestock population. Pigs account for 10.29 million, camels 0.40 million, equines 1.13 million, dogs 11.67 million, mithun 0.29 million, yaks 0.07 million, rabbits 0.592 million and elephants 0.0022 million.

Considering the large livestock population of the Country vis a vis number of veterinarians in service sector (around 34,500) for health coverage, the country is not having sufficient manpower for managing animal health effectively. The veterinarian: animal ratio comes to around 1:10-15 thousands. This is the ratio when poultry as well as wild, zoo and laboratory animals are not accounted for. In some of the states the ratio is still wider. The National Commission on Agriculture (NCA, 1976) recommended one veterinarian for every 5,000 adult cattle units. However, with substantial increase in production potentials of livestock and wide spread introduction of foreign blood needing intensive management and health care, the ratio between the exiting animal population and available veterinarian need to be narrowed down so that one veterinarian is available per 2,500 - 3000 cattle units for better health care and management practices for accomplishing higher LS production, productivity and profits. This recommendation also meets the norms set by the World Organisation of Animal Health (OIE).

2.4.2 Estimates of Manpower Requirement

Considering the changing trends for higher demand of animal products in the food basket and increasing realization of livestock, poultry and fishery in the diversified agriculture, and the significance of the production system approach, specially to face the lurking danger of climate change and global warming, and anticipated developments in diversified spectrum of veterinary, animal and allied sciences, projection of manpower need by next 2 decades (till 2035) has been projected in the Table No. 5.

Table 5. Anticipated Requirement of Veterinarians by 2035

Name of the Organization	Manpower required
State Animal Husbandry Departments	1,00,000
SAUs/SVUs	8,000
ICAR/Scientific organizations	2,000
Private Sector & self-employment	5,000
Pharmaceuticals & Immuno-biologicals	1,000
Animal Feed Industries	1,000
Banks & financial institutions	1,000
Defense sector	400
LS and Poultry Farms	1,000
Poultry Sector	2800
Livestock Food Industry and Quality Control	2600
Zoo and Wild Animals	200
Total	1,25,000

These figures, on the estimates of requirement of veterinary professionals, corroborate well with the document presented by working group 2011 for 12th plan (2012-17) of the Department of Animal Husbandry, Dairying and Fisheries, GOI to the Planning Commission, and the one worked out by the Institute of Applied Manpower Research (IAMR) and NAARM in Nov., 2011. As per the estimates given for human capital requirement by the Working Group on A.H. & Dairying, 2011, against the requirement of 75,000 veterinarians only 34,500 are available. Similarly, against the requirement of 7500 veterinary and animal science specialists for teaching and research, only 3050 are available. The sectors in which requirement of human capital in veterinary and animal science is expected to rise further in future include: defense, wildlife, bio-security, public health, veterinary extension, forestry, insurance and industries like dairy, meat, poultry, pharmaceutical and animal feed industries. Going by the above figures, it is crystal clear that the shortage of veterinary human resource is alarming. We are falling short of the ideal figure by about 50 per cent.

3. Approach to fill the Human Resource Gap

To harness the animal husbandry and livestock sector for further growth and contribution to rural livelihood and inclusive growth, human resource development is a vital factor, particularly at this juncture when crop agriculture is confronted with depleting natural resources and decline

in total factor productivity. The existing structured veterinary services, supported mostly by the public sector institutions, comprising of about 57,973 veterinary hospitals, polyclinics, veterinary dispensaries, veterinary aid centers, mobile dispensaries, frozen semen banks, semen production centers and around 77,765 A.I. centres spread throughout the country are offering fairly good quality, if not ideal, skeleton veterinary services to millions of farmers and livestock keepers.

To bridge the wide gap between the currently available faculty strength in the veterinary colleges/institutes and deemed universities offering undergraduate and postgraduate programs and the available manpower, there is a need to have at least 4,450 more teaching veterinarians in addition to attrition and retirement rate of 4% annually. In order to fulfill the increasing requirement, action is required on war footing with aggressive approach. Thus, it is essential to strengthen the faculty position in existing colleges to produce the required manpower to manage both UG and PG teaching, research and technology dissemination responsibilities. As a long term strategy, additional teaching and training institute are required to be created.

Since the entire burden for HRD cannot be fulfilled by the public sector organizations, involvement of private sector needs to be encouraged. Government should take a pro-active and pragmatic approach in developing 'Public Private Partnerships' (PPP). Active participation of private sector would complement the efforts of public sector organizations. However, in the process of undertaking expansion programs at a faster pace, the quality assurance should not be lost sight off, and need to be ensured at all level.

Likewise both Central and State Governments should provide substantial funding to produce adequate, timely and quality human capital as per the need. Adequate infrastructure support by creating modern veterinary hospitals and associated units as per the realistic needs of present and future requirements would require priority attention. Adequate funds should be made available to improve the infrastructure of the existing establishments as per the regulatory norms. Many hospitals, particularly those located in remote and difficult areas are not adequately equipped and often lack regular electricity and other basic amenities. Governments should come forward to improve the pathetic conditions of veterinary hospitals, dispensaries and other aid centers.

3.1 Creation of Additional Institutions

- Every State should have at least one Veterinary University (SVU). Further, there is also a need to create Central Veterinary Universities (CVUs) in phased manner in livestock dominated States. National and States' policies should be conducive to attract private sector to establish veterinary and animal science universities. Possibilities should be explored to establish Post Graduate Institute of veterinary education and research (PGI VER) in some of the potential States for which ICAR or Central Government should give substantial fund allocation.
- There is a need for 50-60 additional Veterinary Colleges in the country. Both public and private sector organizations must initiate action in this direction. It is also desirable that some potential UG Colleges be upgraded to start PG programs
- Govt. should play a pro-active role in creating Institutes/ Universities of Global order through PPP.
- Govt. / ICAR should create an independent National academy of Livestock Research Management (NALS RM) on the pattern of NAARM.
- SVUs should create institutions/ schools/ centers of Biotechnology, Economics and Business Management, Wild life, Forensic Sciences, Food Sciences & Animal product technologies,

and Quality control Unit to boost export potentials. Possibilities should be explored to create diversification in the existing degree courses in order to cater to the needs of different sectors. Universities should also venture to create bio-diversity Parks, technology incubators etc.

4. Strategies to manage human resource

In the process of developing strategic planning for HRD for academic stream to manage teaching and research institutions vis- a- vis professionals engaged in service sector somewhat differential approaches are required. Though highly skilled and competent professionals are of paramount significance in every sphere, but to manage educational institutions, including research and technological driven areas, specialized cadre strength with higher qualifications (post-graduation-preferably PhD) is a pre-requisite, while for rendering field services (service sector) major work force is constituted by veterinary graduates. Time of course demands more and higher qualified personnel to take care of health and management services at veterinary hospitals, LS farms, A.I centers and other allied field service units with basic qualification of graduation in veterinary science & AH for these primary cadre posts. Besides, there is need for specialized cadre to manage expertise services like polyclinics, diagnostic centres, biological product divisions, research units/ farms, policy planning and managers. For such focused professional activities, the qualifications need to be laid down or required to be delineated as and when necessary as per the assigned responsibilities.

4.1 Service Sector

The basic pre-requisites for having quality professional services and their effective delivery to the end users include: professional competence of the graduates, committed and competent human resource, sound financial backup, good infrastructure at work place, operational freedom and congenial environment. Curriculum should aim to address the present day needs and evolve continuously with time. The OIE (World organization for animal health) has issued guidelines on ‘Veterinary Education Core Curriculum’ (2013) wherein it has been emphasized that pre-requisite requirement for curriculum development is to delineate DAY ONE COMPETENCIES of a graduating student who has the capability to render quality service. Core curriculum should ensure building in all components necessary to make Day one competence of graduates achievable.

Further, in order to ensure that the services from professionals are relevant to faster scientific developments and technological revolutions under changing world order, every professional should get opportunity for continuing educational programs at least once in every 5 years. In addition, the institution should organize regular skill based training programs and refresher courses for competence enhancement. The graduates should be encouraged to enhance their qualifications with liberal benefits by granting study leave, PG allowance, advance increments or benefits towards cadre upliftment etc.

4.2 Academic Stream

Academic institutions including scientific organizations and the personnel managing them are the builders of the national wealth consisting of professional, technological innovation, livestock production, and value addition linked with market intelligence thereby raising socio-economic status of livestock farmers. The institutes should be of high order with competent and qualified manpower for effective delivery of quality education and research. Since research is the mandatory requirement as partial fulfillment of PG degree, the institution/ department offering PG programs should have a sound research base.

The policies and programs in the organization should be conducive for recruitment and retention of faculty. Merely inducting manpower without ensuring quality would amount to compromising with the standards. Such practice would breed mediocrity in the system. There is thus a need for a very cautious approach in man power planning and phasing out institutional developmental programs as per the need and availability of resources. A proper balance has to be kept between demand and supply. Mushrooming of institutions with sub-optimal facilities/ resources or compromising with the quality of human resource would be counterproductive. For ensuring human resource quality, faculty competence programs, exposure of working in centers of higher learning at national and international level, provision of sabbatical leave, visiting professorship and developing linkages etc. need to be put in place.

It is proposed to create a National Academy of Livestock Research Management (NALRM) on the pattern of National Academy of Agricultural Research Management (NAARM). Such an academy would focus on LS research management and structure training programs in diversified spectrum of veterinary, animal sciences and allied sectors.

4.3 HRD Scenario in Dairy sector

Besides the degree course in Veterinary and Animal Sciences (B.V. Sc & A.H), the other vital academic stream contributing for Livestock development programs is HRD through Dairy education. The primary degree program in dairying is B. Tech. in dairy technology, a 4 year degree course. There are at present 19 institutions, 14 of which are Dairy Tech/ Science colleges with SAU/SVU/DU system offering undergraduate program. In addition, some colleges, mostly from private sector, offer B.Sc. Dairy Husbandry or Dairy Science. Although Dairy Technology colleges are offering M. Tech. and Ph.D. in different sub-disciplines of Dairy Technology such as Dairy Engineering, Dairy Micro-biology, Dairy Chemistry etc., Master's and Doctoral programs are also offered by many Veterinary and Agricultural colleges, IITs, private sector colleges in Dairy Sciences, Dairy Husbandry, Dairy and food engineering etc. Further, Dairy Diplomas of 1-2 yr duration are offered by some institutions including NDRI. On an average, 200 students with B. Tech. in Dairy Technology from Dairy Science Colleges, and around 100 with M. Tech. / M.Sc., and 60 doctorates pass out every year in India. In addition some graduates and post graduates are produced from SAUs/ SVUs/ agricultural colleges.

Demand of human resource for graduates and above in Dairy sector by 2020 as per the reports of NAARM and IAMR/ has been estimated to be around 25,000 in milk processing and from a few hundreds to 1500 in milk procurement, State departments, teaching and research etc. The total requirement of Dairy professionals is projected as 30,000. There will also be a huge demand for Diploma holders to the tune of 6, 40,000 mainly to cater to the needs of milk procurement.

Dairy being more diversified sector may require different approaches and strategies for HRD. Unlike in veterinary and animal science sector where primarily professional service are managed by veterinary graduates and post graduates (and Para-vets), different types of specialists such as veterinarians, animal scientists, chemists, microbiologists, technologists / engineers, R&D personnel, quality assurance engineers, marketing personnel, management experts, and economists are required to manage value chain in Dairy sector.

5. Recommendations and Road map

5.1 Addressing HRD/HRM Needs

- The output of veterinary graduates may be increased in the short term by increasing the annual UG admission intake in the existing colleges from the present 60 to 80-100, and by establishing new veterinary colleges in public and/or private sector as a long term strategy. The seats for post graduate courses have also to be increased accordingly. The number of these colleges is required to be doubled by 2020.
- The existing minimum standard of veterinary education (MSVE) Regulation, 2008 should be revisited on priority in respect of faculty requirement, syllabus revision, academic regulations, and examination system. Diversification in degree program may be considered as per need assessment and employment potentials.
- Feasibility to introduce specialization in B.V. Sc. & A.H. degree program may be explored and then it may be introduced in the 4th & 5th years after successful completion of core courses in first three years. Courses on professional competence and area Specific needs, viz. clinical veterinary practice (companion and food animals / equine / wild animal, etc.), production sciences, product technologies and other industry and entrepreneurship related specific areas, need to be included.
- Introduction of integrated courses need to be discussed by the faculty, academic council, and board of management. Thus, the possibility of introducing dual degree programs (e.g. B.V. Sc. & A.H. and M.V. Sc., B.V. Sc. & A.H. and MBA or M.V. Sc. and Ph.D.) along with multiple entry and exit points need to be explored. New diploma and certificate courses may also be initiated in veterinary, animal sciences and allied disciplines.
- Continuing Veterinary Education Programs in the form of Refresher courses, training, workshops, summer and winter schools need to be taken up on priority for periodical updating of knowledge, skills, attitude and competence of the professionals working in line departments, industrial houses or self-employed as entrepreneurs. Each faculty member should get an opportunity at least once in 5 years to enhance his / her knowledge, skill and competence.
- Trained manpower is required for primary processing of livestock products / by-products at village level for boosting rural economy through off-farm employment generation and value addition of the produce. Special cadre strength needs to be developed to meet the requirement of middle level managers with appropriate training programmes.
- Regular induction and replenishment of faculty on priority for quality education and fill the gaps between HR demand and supply is necessary.
- Devising and introducing appropriate orientation courses should be undertaken as per requirement.
- Public Private Partnership (PPP) in veterinary and animal science education should be encouraged by making specific fund allocations.
- Every SVU, CAU should be allowed to make regular recruitments to retain proper strength and keeping proper balance in different cadres of the faculty.
- Requirement of NET should be assessed for its utility or otherwise as an entry qualification of faculty in veterinary and animal sciences.

5.2 Strategies to bridge the gaps

- Provision for inducting fresh meritorious B.V. Sc. & A.H. students in the faculty as teaching associates.
- Relaxation in NET for fresh recruitments for the post of Assistant Professor.
- The stipend for PG students may be made at par with the emoluments given to field veterinarians in service so as to attract them for higher studies.
- New veterinary colleges should be opened in both public as well as private sectors.
- There is need for developing suitable PPP model(s) for attracting private sector participation by providing incentives, such as sharing of recourses of land, infrastructure and expertise between public and private sectors.
- To overcome the shortage of faculty, structured arrangements need to be in place to utilize the services of retired faculty. Age should not be a deterrent factor so long one possesses professional competence and maintaining sound health. The emoluments should also be attractive.
- ICT should also be allowed to fill up the gap in faculty as well as providing an opportunity to the students to be taught through ICT by renowned professors.

5.3 Private Sector Participation

- Clear cut policy and guidelines are required from the Central Government-Animal Husbandry Department/ VCI on modalities of establishing and operating private and government colleges.
- A suitable model for PPP should be developed and circulated to the states for implementation. A policy framework for 'Public Private Partnership' in veterinary and animal science education needs to be developed.
- Existing problems in imparting education through private sector needs to be assessed and attempts should be made to regulate these on realistic basis so that un-certainties are not required to linger on.
- All regulatory authorities and stake holders should develop joint mechanisms for proper regulation of colleges which are technically sound.

5.4 Addressing HR needs of the Industry

- Practical approach in farm management and entrepreneurship needs to be focused for enhancing skill competence.
- The student should be trained in information & communication technology courses so as to make them conversant to the needs of industry.
- The industry should assess human resource requirements for the next 10 years with the help of independent third party. They should interact with government organizations and universities. All universities should create a cell to have interface with industries, private sector organizations and self-employed professionals.
- Veterinary professionals should be properly trained in communication and management skills. Practical approach in farm management and entrepreneurship needs to be focused and skill competence should be enhanced.

- The internship program of the graduating students should be clubbed with specific industries so that the graduates are equipped to become competent in their chosen field on day one, and are able to seek their entry into private sector organizations of their chosen industry.
- To have wide participation on contemporary issues, introduction of ‘Vetpedia’ - an open forum - needs to be created.
- It would be appropriate for the industries to pick up graduates in campus interview well before the commencement of internship, and explore the feasibility to structure their internship training as per need.

5.5 Policy Issues

- At least one Veterinary and Animal Science University (SVU) should be created in all States. Besides, at least four Central Veterinary Universities (CVUs) may also be created on regional basis in the country.
- Policies need to be in place to attract private sector to establish veterinary and animal science universities/colleges.
- Post Graduate Institutes in Veterinary Education and Research (PGI-VER) should be established with financial support of ICAR / Central Government / State Government / private sector in potential States such as Gujarat, Maharashtra, U.P., Punjab, Haryana, Bihar, M.P., West Bengal, Andhra Pradesh, Kerala, Karnataka, Maharashtra, Himachal Pradesh, Uttarakhand, Odisha, Tamil Nadu, Jammu and Kashmir, on the lines of the PGI-VER being established by RAJUVAS in Rajasthan.
- There is an urgent need for creation of 50-60 additional veterinary colleges in the country both in public and private sector, besides strengthening UG colleges to start PG and Ph.D. programs so as to fulfill the HRD requirements of the growing LS sector.
- Govt. should play a pro-active role in creating universities / institutes of global order possibly through the participation of private partners.
- SVUs should create Institutions/ Schools/ Centers of Biotechnology, Bioinformatics, Chemoinformatics, Nanotechnology, Livestock Economics, Livestock Business Management, Wild life, Forensic Sciences, Food Technology, Animal Product Technologies, Organic Animal Production, Conservation of Animal Biodiversity, Use of Space Based Technologies for Animal Sciences, Engineering and Technologies for Animal Sciences, Feed and Fodder Resource Management and Technologies, Disaster Management for Animals, Animal Bio-Medical Waste Disposal Technologies, State of the Art Quality Control Labs etc. to boost opportunities for HR as well as to exploit potential of livestock and livestock produce/products.
- For making curriculum more relevant to the present day needs, diversification in degree course and possibility of dual degree program with multiple entry and exist levels should be explored. Possibilities should be explored to create diversification in the existing degree courses in order to cater to the needs of different sectors such as health management, product technology, marketing etc. Universities should also venture to create relevant Bio-diversity Parks, Technology Incubators etc. There is a need to incorporate Choice Based Credit System (CBCS) as is a flexible system of learning that permits students to learn at their own pace, choose electives from a wide range of elective courses offered by the University departments,

adopt an inter-disciplinary approach in learning, and make best use of the expertise of available faculty.

- An independent National Academy of Livestock Research Education and Management (NALREM) on the pattern of NAARM should be created by the Govt./ICAR to address the livestock and animal science specific issues.
- Since Veterinary education as well as the Universities are also State subjects, a coordinated Center-State approach in establishing and monitoring the educational institutions needs to be developed.
- For manpower need assessment and short and long term planning for HR development for meeting the national and regional needs, and for speedy development and implementation of HRD programs, constitution of a Manpower Planning Board comprising of representatives from the centre and the state is recommended.
- Intake capacity in all the veterinary colleges should be suitably raised from presently 60 to 80-100 seats in each college after analyses of the strength and performance index of the college in order to meet the demand for the human capital as an immediate short term measure.
- SOP and Guidelines for inspection of colleges should be developed and provided to the inspectors by the VCI before inspecting any college. It would be desirable to have a panel of inspectors / evaluators / experts. Their qualifications and status should be kept in mind while inducting one in the panel of experts. Mechanisms may be developed to impart structured orientations / training to the inspectors/experts on various facets of IVC Act, regulations, guidelines and manner of conducting inspection of a college. Basis of inspection should be to judge adequacy of facilities essentially required for imparting training to the students, excluding desirable standards. There is an urgent need to revisit the prescribed minimum norms of the VCI so that these become at par with UGC, ICAR, MCI etc.

6. Epilogue

Under the changing scenario of rising demands for livestock products and climate change threat, innovative holistic approach is needed to bring transformation in veterinary and animal science education for boosting livestock production and productivity for inclusive growth. We need to have a vibrant and dynamic system, especially for producing competent and self-reliant professional human resource, possessing the capabilities to swiftly adjust to the changing needs and environment. This, of course, will require paradigm shift in the mind set of education administrators, regulatory bodies, policy makers etc. coupled with dynamism. Both central and state governments are required to accord higher priority to livestock sector inclusive of poultry and fishery, and make available substantial funding on sustainable basis for ensuring faster development for achieving needed excellence. To accomplish these goals, coordinated efforts of Central and State governments, scientific organizations, academies and associations, the universities & colleges, private players, industrial houses and other stake holders are the need of the hour so as to revamp the education system to enable it to produce appropriately qualified HR for faster development of livestock sector.

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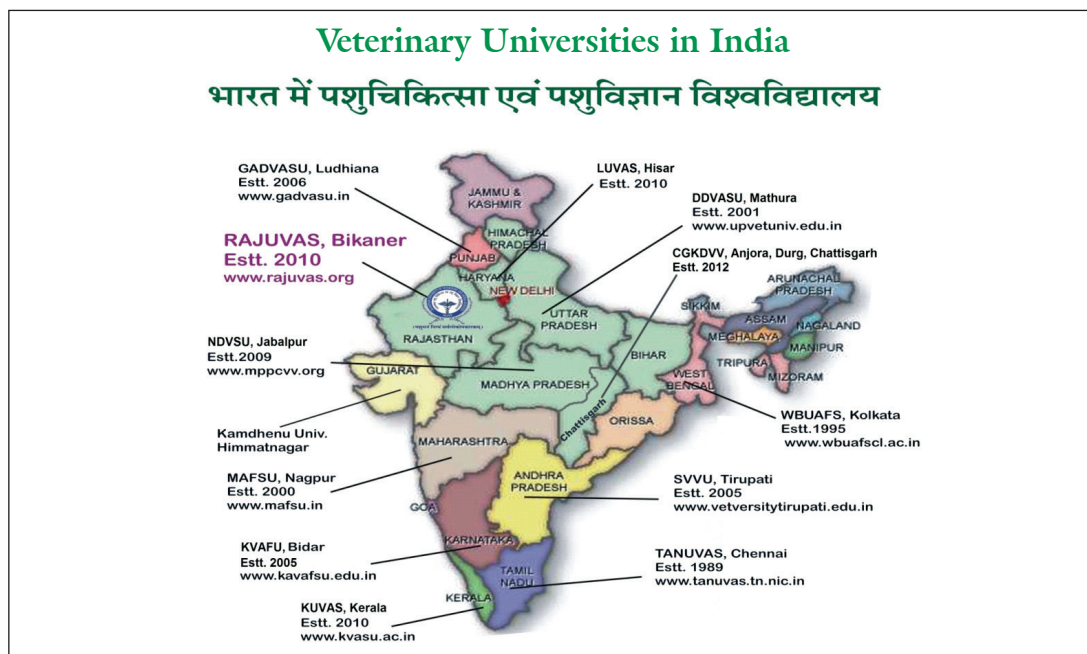
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