



Forecasting manpower requirement in Indian veterinary and animal husbandry sector

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ABSTRACT

This paper presents a comprehensive assessment of demand-supply scenario for human resources in veterinary and animal husbandry sector in India. Mixed forecasting approaches are used to estimate stock and future demand. The annual demand has been computed by integrating stock projections in different sub-sectors of employment. During the last decade, supply of veterinary and animal husbandry graduates has increased at 4% per annum. The forecast indicated additional annual requirement for about 5,000 graduates and thrice more para-vets up to 2020 to meet the supply demand gap. The paper hints at strategies to support academic research and private sector participation to meet the emerging demand.

Key words: Demand for para-vets , Forecasting veterinary human resources, Manpower in livestock sector in India, Supply-demand of veterinarians in India, Veterinary manpower

Livestock sector is an important sub-sector of Indian agriculture and plays significant role in the food security and development. During 2006–07, livestock sector contributed about 5% to the total GDP (CSO 2011) but its share gradually declined to 3.9% in 2010–11. However, the 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.

Livestock is an important source for employment. The animal husbandry sector engages about 22.4 million population, which is around 5.5% of the total work force in the country (NSSO 2011). Animal husbandry activity engages household members round the year. Gender equity and economic empowerment of women is more pronounced in livestock sector, as women participation is 71% of the labour force, while it is only 33% in crop farming (GOI 2010). Trained veterinary graduates and para-vets are key to growth in livestock sector. This paper assesses their future demand in the country.

MATERIALS AND METHODS

The forecasts for veterinarians required in 2020 were made

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with a mix of exploratory and normative forecast methods through a modified Parnes's approach (Parnes 1962). Choice of method was based on the data availability in different sub-sectors. The primary data for the study were collected through focused group discussions and nation-wide survey of 525 establishments in 103 districts, educational institutes, 796 individual experts, and 507 alumni. Secondary data were collected from published reports, official publications and web sites of related organizations. The collected data were also supplemented with the feedback received in 10 focused group discussions held at different regions.

Demand forecasts were made in terms of stock, i.e. the number of economically active personnel. The different sub-sectors considered were (a) public and private animal health services, (b) veterinary industry, (c) research and education, (d) banking and insurance, and (g) others. For each sub-sector projection of the stock from the base year (2010) was made, considering the growth rate for different sub-sectors computed either from the trend data, or from growth targeted in the plan documents, or from the rationalized experts opinion. Supply stock was estimated from the annual outturn of graduates from academic institutions.

RESULTS AND DISCUSSION

Education in veterinary science and animal husbandry: Veterinary Council of India (VCI), a statutory body constituted by the Government of India under the Indian Veterinary Council Act 1984, regulates veterinary and animal husbandry practice and education in the country (VCI 2011).

Table 1. Students outturn in veterinary sciences courses during 1991–2010

Year	Diploma	UG	PG	PhD	All graduates
1991–92	0	1428	539	94	2061
2001–02	8	1612	566	72	2253
2009–10	3136	2132	945	130	3207

Source: Data for 1991–92 is from Rama Rao and Muralidhar (1994) and data for 2001–02 and 2009–10 is from Rama Rao *et al.* (2011).

During the year 2011, there were 48 colleges offering courses in veterinary sciences and animal husbandry. Of the 48 colleges, 46 are part of the Agricultural Universities and ICAR and 1 each under general university and private sector. The intake capacity for animal science courses in agricultural universities in India is about 13,310. Course level-wise the intake capacities are 157 in certificate courses, 4,202 in diploma courses, 4,880 in undergraduate (UG) courses, 3,084 in postgraduate (PG) courses and 983 in doctorate (PhD) courses (IASRI, 2012). The outturn during 1991–92, 2001–02 and 2009–10 are given in Table 1. The annual outturn of veterinary graduates (UG, PG and PhD) increased from about 2,061 in 1992 to 3,207 in 2010.

Estimates of stock of veterinarians in 2010: A number of sources provide information on the number of veterinary graduates. An exhaustive analysis made through cumulating of institutional outturns. Historical data for the past 4 decades were obtained from CSIR (1993), Rama Rao and Muralidhar (1994), IAMR (2001), DST (2010) and Rama Rao *et al.* (2011). This approach provided a fairly accurate time series. The total stock of veterinary graduates estimated from annual supplies is about 40,232 in 2010. This compares well with other estimates of 40,700 based on census data and 43,000 based on Indian Veterinary Practitioners' Register of VCI. Considering these different estimates, the stock of veterinarians in the country has been taken as 41,000 in the base year, i.e. 2010.

Demand forecast

Demand forecasts were made for each of the sub-sectors separately as discussed below.

Public veterinary services: There were 9,527 veterinary hospitals/polyclinics, 20,897 veterinary dispensaries, 24,482 veterinary aid centres and 67,048 artificial insemination centres offering quality veterinary services. On an average, each dispensary may have one veterinary doctor, a hospital may have 2 to 3 doctors and a polyclinic may have 8 to 10 doctors. The total number of veterinarians should be around 40,000 in ideal situation. Against this, availability of about 22,000 veterinarians and 13,000 para-vets in 2010 is far below the requirement (GOI 2011a). Further, about 30% of the posts being vacant, there is acute shortage in the veterinary hospitals and dispensaries. This highlights the current gap

between requirement and supply.

The existing veterinary service delivery institutions in different States are far less than the actual requirements. With increase in these units the demand for veterinarians would further go up. The projected demand at a modest growth of 1.5% per annum, the stock of 22,000 in 2010 would grow to 28,200 in 2020.

Private veterinary services: Private veterinary services include those provided by non-governmental organizations and also individual private veterinary practitioners. The number of private practitioners is growing over the years. From an estimated 900 in 1993, the number of private veterinarians has grown to 1,055 in 1996, 1,800 in 2000 and 2,060 in 2004 (www.oie.int). Assuming that this rate of growth continued beyond 2004, the estimated number of private veterinary practitioners would be about 4,000 in 2010 and 8,000 in 2020.

Apart from private veterinary practitioners, there are *goshalas*, non-government organizations and private sector providing veterinary services. BAIF Development Research Foundation has nation-wide network of centres providing livestock improvement services employing about 5,000 para-veterinarians and about 500 veterinarians. The number of veterinarians required in private sector (other than industry) is placed at 4,000 veterinarians in 2010 and is projected to grow to 10,000 by 2020, and para-veterinarians from 6,000 to 12,000.

Academic and research: The total staff sanctioned for teaching in veterinary related disciplines in SAUs in 2010 was estimated at about 3,368, out of which 1,944 were in position. Thus, 42% positions are vacant. Projections for the future years were worked out assuming that the faculty requirements would grow at the same rate as the outturn in graduates (i.e 4% per annum). This provides for filling of the vacancies to some extent and also recruitment of faculty in new colleges. On this consideration, the stock would grow to about 3,000 in 2020.

Animal science institutes of ICAR have 1,044 scientific posts in 2010, with about 20% vacancies. A moderate growth to the extent of filling up of vacancies is assumed. In the private sector, research requirement is confined to few disciplines like animal breeding and bio-technology. Their number is small. Together, it is expected that the number of graduates needed by research will grow from about 1,200 in 2010 to about 2,000 by the year 2020.

Dairy industry: Dairy industry engages the services of veterinarians and animal scientists. There are about 850 dairy plants – about 250 in cooperative, 550 in private organized sector and the others in government sector. Except for few large co-operatives like Amul and Dudhsagar dairy, most of these units depend on the public animal husbandry machinery. A growth rate of 5% per annum was assumed for estimating growth in the number of dairy plants and manpower requirement. The number of dairy plants is projected to grow

to about 1,400 by 2020. Thus, the dairy sector requirement of veterinary human resources may be placed at about 500 graduates and 500 diploma holders in 2010, which would grow to 900 graduates and 900 diploma holders by 2020.

Veterinary pharmaceuticals: There are about 150 pharmaceutical firms engaged in production and distribution of animal drugs and other medical equipment for treating animals (CSO 2011). Establishment survey showed that, on an average, a veterinary pharmaceutical company engaged 8 veterinarians (5 graduates, 2 post-graduates and 1 doctorate). The estimated number in this sub-sector is 1,180 in 2010. This industry is growing at about 15% per annum. The requirement of veterinarians and animal scientists is likely to increase at 10% per annum, to about 3,050 by 2020.

Animal feed industry: In 2010, the supply of fodder (green and dry together) is estimated at 846 million tonnes and it is projected to grow to 1,764 million tons in 2020. About 50% of the marketed feed is produced in the organized sector. According to Annual Survey of Industries, there were about 500 animal feed plants registered under Factories Act in operation in 2006 (CSO 2011). The establishment survey indicated that on an average a feed plant employed 30 persons, of whom about 7 comprise human resources relating to animal sciences – with graduates and diploma holders in 4:3 ratio. On this basis, and assuming that the operating factories in 2010 number about 600, it is estimated that the total human resources in animal and veterinary sciences in the animal feed units is of the order of 2,250 veterinarians and 1,950 para-vets. Total employment in animal feed industry during the period 1998–99 to 2005–06 recorded a growth rate of 10% per annum (CSO 2011). Projections for the future were obtained assuming the same rate of growth. The stock requirement of human capital in 2020 is estimated to be about 5,800 veterinarians and 5,060 para-vets.

Animal breeding: The requirement for animal breeding is made for private sector only as government farms are covered under public services. Poultry breeding is exclusively in the private sector. According to the establishment survey, an average animal breeding farm employs 24 persons, comprising 2 or 3 graduates in animal or veterinary sciences. The precise number of animal breeding farms is not known and not all of them have their own veterinary human resources. In view of this, a very rough estimate of veterinary and animal science human resources is made as 900 in 2010, which may rise to 1,800 by 2020. Corresponding requirement for para-vets is 80 and 160, respectively.

Meat processing: The Eleventh Plan targeted a GDP growth of 10% per annum for the meat and meat products sector. There are, about 60 meat processing units registered under the Factories Act (2005–06) and employment in this sub-sector had grown at an annual rate of 11% during the period 1998–99 to 2005–06 (CSO 2011). Establishment survey indicated that about 3% of this employment comprises veterinary human resources with two-thirds graduates and

one-third diploma and other certificate holders. The projected stock demand for veterinarians would increase from 1,020 in 2010 to 2,647 in 2020 and from 160 to 420 for para-vets.

Financial institutions: Financial institutions like NABARD, banks and insurance companies engage veterinary graduates for credit and livestock insurance activities. Increasing business is boosting the demand for veterinarians for operationalization and monitoring of the schemes. Employment of all officers in these institutions in livestock fields is estimated around 3,500 in 2010 and projected to grow to 4,500 in 2020, at a rate of 2.5% per annum.

Others: A number of micro-organisations like agri-clinics and rural service centres under various government schemes, need para-vets to provide veterinary services at low cost. As these requirements are from unorganized sectors, it has become difficult to make a rational estimate of their demand. Dairy sector already has about 130,000 rural milk cooperatives. To extend professional services they would ideally need one para-vet in each centre. Based on such initiatives and also experts views in focus group discussions, the requirement of para staff in micro-level organizations is estimated to be about 180,000 by 2020. Assuming certificate to diploma holders in the ratio of 2: 1, the requirement for diploma holders for such micro-organisations would be about 60,000 by 2020. The human resources requirements of the sectors covered above have been inflated by 10% to take care of other sectors not specifically covered.

Gross stock demand projections: The overall stocks of veterinary and animal sciences human resources required to meet the requirements of various sub-sectors have been added up and the projections are given in Table 2. The stock of veterinary graduates required in the country is projected to go up from 42,000 in 2010 to about 68,000 by 2020. The requirement of para-vets would grow from about 34,000 in 2010 to 100,000 by 2020.

Table 2. Estimated stock requirements of veterinary human resources

Sub-sector	Diploma		Graduates	
	2010	2020	2010	2020
Public health services	13068	16718	22000	28192
Private health services	6000	12000	4000	10000
Academic	0	0	2200	3384
Research	0	0	1200	2000
Dairy industry	500	895	500	895
Pharma industry	24	62	1,176	3,050
Feed industry	1,953	5,066	2,247	5,828
Breeding farms	78	156	922	1,785
Meat industry	161	418	1,020	2,647
Financial services	0	0	3,500	4,480
Others	2,178	65,450*	3,401	5,495
All	33,963	100,764	42,166	67,756

*Others include requirement in micro-level organisations.

Gap in stock: In 2010, the actual stock from supply was about 41,000, needing additional 28,000 by 2020. Assuming the outturn levels will grow at the same growth rate as observed during the last five years (i.e., 4.3% during 2006–10), the estimated supply would be 48,433 and the demand-supply gap would be about 19,300.

Required outturn forecast

The annual outturn required from the educational institutions under average growth scenario is given in Table 3. Break-up by level of qualification obtained on the basis of their proportions in each of these sub-sectors was obtained from establishment survey. The average annual flow from 2010 supply and 2020 demand are presented in the Fig. 1.

The projections suggested that by 2020, the annual outturn required from the veterinary science education system should be about 7,670 graduates, i.e. 5,330 under-graduates, 1,850 post-graduates and 490 doctorates, rising from 1,800 under-graduates, 800 post-graduates and 125 doctorates in 2010. The gap or additional number to be produced as compared to the current level is about 5,000 graduates (3,570 under-graduates, 1,060 post-graduates and 360 doctorates). The annual requirement of diploma holders is about 4,100 in 2010, which would increase to about 14,700 in 2020.

A critique on norms: In medical and health sectors, manpower requirement approach based on norms is common. National Commission on Agriculture in 1976 suggested a norm of 5,000 bovine equivalents per veterinarian (GOI 1976). For this, 1 bovine equal corresponds to 2 sheep/goats and pigs, 10 small ruminants, and 100 poultry. With an active stock of 41,000 veterinarians in 2010, and the estimated bovine equivalent population of 447 million (DAHD 2011), the number of animals looked after is far above 10,000 per veterinarian. The norm of 5,000 animals per veterinarian require stock of 97,000 veterinarians by 2020. This is much higher than this study estimate of 68,000 required by 2020. It is difficult to visualize availability of such a large number by the year 2020. However, this norm could only be partially met by increasing number of para-vets in the country.

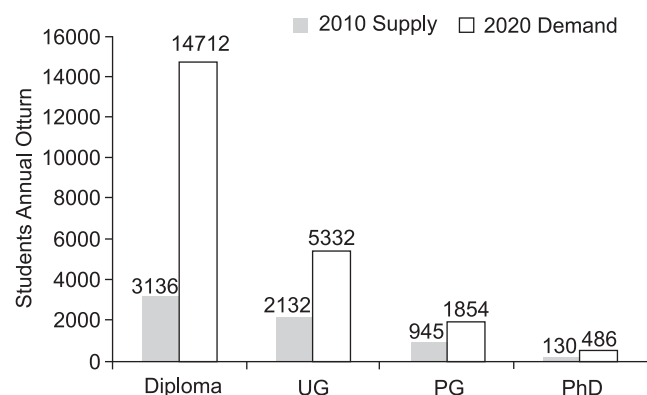


Fig. 1. Supply in 2010 and required outturn in 2020 for veterinary human resources.

Table 3. Required annual outturn and demand-supply gap for veterinarians

Education level	Number of veterinarians			
	2010 supply	2020 demand	Gap	Gap as % demand
Diploma	3,136	14,712	3,964	78.7
UG	2,132	5,332	3,200	60.0
PG	945	1,854	909	49.0
PhD	130	486	356	73.3
All graduates	3,207	7,672	4,465	58.2

Sector growth: Livestock sector is showing relatively better growth than agriculture sector. However, during past 2 decades, veterinary education has shown a growth rate less than 4% per annum. This is much low as compared to growth in other agricultural sciences or professional sciences like medicine and engineering. Within livestock sector, poultry sub-sector experienced much higher growth. In fact, there is a feeling that poultry sub-sector deserves to have separate manpower development as the core sector is not able to provide the type and number needed for its requirement (Shasidhar 2009). However, a macro view would make one to realize the fact that the overall supply is far less than required. Such low growth in education is leading to inadequate supply of trained professionals, which has an impact on the quality of services and exploiting sector potential for desired growth and development.

State support: Quality of education would improve with strong research base in the academic institutions. A related experience in US is noteworthy. On facing annual shortfall of about 5% veterinarians, the state addressed the issue through enhanced federal grants (US \$1.5 billion over 10 years) to universities to fund research and increase the number of students (Mark Schoeff 2008). Considering the stagnation or declining federal grants, the academic veterinary leaders in US decided to visit congressional offices to advocate support for animal health research programs (PR News Wire 2012). In India also, there is need to sensitize policy makers and also citizens at large on the role of veterinary services in food security vis-à-vis enhanced support for research in academic institutions.

Grading: One major concern expressed by experts from both public and private sectors is on inadequate availability and decline in quality of graduates. With nearly 40% vacancies, the existing faculty are under severe strain. Many veterinary colleges in the public system do not satisfy the VCI norms in terms of number of faculty and facilities. These 2 constraints are affecting the quality of graduates. Private sector is not keen as veterinary education is not viable in business perspective. A way out for this may be to ease norms and make it attractive. One option is to define grading norms based on the quality requirements and allow students to make their choice. In absence of such proactive measures from

professional bodies like VCI and government of India, veterinary education may not grow and deprive the nation much needed manpower in this sector.

High demand for para-vets: The need for para-vets is seen both in public and private sectors, more in private than in public sector due to expansion of veterinary services in the later and also need for low level trained persons at field level. XII Plan working Group Report projects need for 259,000 para-vets and other supporting staff against availability of only 52,000. The estimated shortage is to the tune of 80% for para-vets (GOI 2011b).

Some states offer Veterinary Polytechnic diploma course after X Class. Besides, there are short duration courses of 1 to 4 months for community/village based service providers. A review of the para vet training programmes in Andhra Pradesh revealed that para vet services are effective but farmers sustaining them through payment is unrealistic (Sastry and Ramalinga Raju 2006). Entry of private sector into the veterinary health care sector is reported to be well received in Maharashtra (Kumar *et al.* 2011). Interestingly, these studies indicated private sector interest in training and development of para-staff required for providing services in rural India. Similar experiences were observed in other developing countries also (Sen and Chander 2003, Irungu *et al.* 2006, Andrew Paterson 2008). Public system may have to fund training para-vets. Therefore, developing para-professionals through private sector participation is economic and viable option.

Vocational training: Government of India has plans to set up more than 1,500 new ITIs and polytechnics, 10,000 new vocational schools and 50,000 new skill development centres across the country (Luv Jasuja and Prashant Kashyap 2008, GOI 2011b). Such new schemes, in addition to existing avenues, need to be sourced for meeting this national requirement. Ministry of Labour and Employment coordinates vocational education and training in the country. As animal husbandry is potential channel for vocational development of rural youth, there is need to synergize schemes under different government departments to develop para-professionals in livestock sector.

Change in academic disciplines: At post-graduation and research level, there is about 40% drop out. Academic sector considers it normal as graduates leave course mid-stream as and when they get job, especially in public sector. This is having direct impact on need for professionals in research and academic sectors. Veterinary and animal husbandry subjects can be treated as two different subjects. This may to some extent meet the requirement of the trained human resources.

In conclusion, the study forecasts additional annual supply of about 5,000 veterinary graduates and thrice this number of para-vets to meet the requirement. The quality of graduates would have to improve through strengthening research in academic institutions. In the light of large shortfall in

availability of required veterinarians, para-staff may provide quick solution. The study recommends state support for development of para staff. As public system is under-staffed and cannot meet the demand for vets and para-vets, it is necessary to encourage private sector.

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