

Assessment of core competencies of veterinarians: implications for policy decisions in India

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Summary

The objectives of this study were two fold – to assess the technical competencies of veterinarians and their application, and to investigate veterinarians' activities and appropriate ways for them to acquire and enhance competencies. The study was undertaken in three South Indian states: Andhra Pradesh, Karnataka and Telangana. The survey data, collected in 2015–2016 from nine districts in the three states, came from in-depth questionnaires completed by 270 veterinary assistant surgeons (VASs). The key survey questions were related to: specific technical competencies and their application, appropriate ways to acquire them, additional competencies needed and recommended activities to enhance them. Each respondent's rating was obtained on (a) how important are these competencies and (b) what is their current level of knowledge and/or skills to perform them? The findings revealed that the current level of knowledge and/or skills was inadequate in production, para-clinical and clinical areas in the day to day work of VASs. The findings suggested that pre-service, in-service and basic induction training, and attending national and international seminars, workshops and webinars are appropriate ways to acquire competencies. Additional skills perceived

as necessary by respondents include: time and stress management skills, motivational techniques, digital communication technologies, and writing and presentation skills. Specific policy interventions suggested and discussed include: adequate hands-on pre-service instruction in veterinary colleges and assessment of competencies before certification; introducing a veterinary licensing examination; reinforcing competencies through induction training, in-service or continuing veterinary education programmes; and improving the institutional mechanisms to assess competencies at regular intervals.

Keywords

Core competency – India – Veterinarian.

Introduction

India's livestock sector is one of the largest in the world, with 56.7% of the world's buffaloes, 12.5% of the cattle, 20.4% of the small ruminants, 2.4% of the camels, 1.4% of the equines, 1.5% of the pigs and 3.1% of the poultry. India had 512.05 million livestock and 729.2 million poultry in 2012 – an increase of 12.39% over the previous census in 2007 (1). The livestock sector grew at an annual rate of 5.3% during the 1980s, 3.9% during the 1990s and 3.6% during the 2000s. Despite this modest deceleration, growth in the livestock sector remained about 1.5 times greater than that of the crop sector, which implies a critical role in cushioning agricultural growth rates. The overall contribution of the livestock sector to India's gross domestic product (GDP) is nearly 4.11%; which is about 21.58% of the agricultural GDP (1, 2). This indicates that the livestock sector is emerging as an engine of growth in the agricultural sector.

Rationale for the study

The observed pattern of growth in crossbred dairy cows, plus the improvements in breeds of buffalo, sheep, pigs and poultry indicate a shift in India towards economically more efficient species. In the case of bovines, the incremental growth is lower in populations of males than in females, mainly because animal draught power is being replaced by

mechanical power and the emphasis is now on milk production. In the case of poultry, broiler production has shown greater annual growth than layer production (1). This shows that India's livestock sector is both expanding and adapting to emerging socio-economic, environmental and technological forces, with direct implications for veterinary service delivery (3).

Although the livestock sector is registering phenomenal growth, several challenges remain unaddressed. These include a shortage in the number of veterinarians (4, 5), poor collaborative linkages (3) and inadequate competencies among veterinarians (6, 7, 8). In India, currently, there are 48 veterinary colleges recognised by the Veterinary Council of India (VCI). In addition, the Indian Veterinary Research Institute started offering an undergraduate programme in the academic year 2015–2016. Ten veterinary colleges are functioning in the study area, i.e. Andhra Pradesh, Karnataka and Telangana states. There is a severe shortage of veterinarians in the country. India needs about 72,000 veterinarians, against the availability of 43,000. All the colleges combined produce about 1,707 graduates per year, whereas the demand for graduates is about 2,500 per year – a shortfall of 31.72% (5).

Livestock production systems and practices are changing, and farmers are increasingly aware of new technologies and improved practices. Competencies of veterinarians need to be enhanced to handle the challenges and meet the expectations of farmers. Overall, veterinarians need to address these challenges and provide the following three types of integrated support to farmers (9):

- delivery of technical services (clinical and para-clinical health care of livestock)
- to make available and provide access to input services and products such as artificial insemination, vaccines, medicines, special equipment, veterinary instruments, appropriate feed stuffs, etc. (to augment production and productivity)
- livestock extension and advisory services (to enrich the knowledge and improve the skills of farmers).

To provide this integrated support efficiently, veterinarians need to have or acquire core technical competencies, remain current with emerging technologies and demonstrate competency in their services (10).

In general terms, competence is a concept that integrates knowledge, skills and attitudes, the application of which enables the veterinarian to perform effectively, and to respond to contingencies, change and the unexpected (11). Core competencies are a collection of observable dimensions – individual skills, knowledge, attitudes, behaviours, and collective processes and capabilities – necessary for individual, organisational and programme success (12). Being only knowledgeable and/or intelligent does not indicate that a person is an effective and efficient provider of services – performance is a function of knowledge plus skills and attitudes (13). Hence, competencies of veterinarians should be judged on (a) how knowledgeable they are in their technical subject areas, and (b) how skilful and able they are in applying that knowledge when delivering services to clients.

Aims of the study

The main aims of the study were:

- to assess the competencies of veterinarians in technical subject matter and their skills for the application of competencies
- to investigate veterinarians' activities and appropriate ways to acquire and enhance core competencies.

Methodology

Study locale and sampling

The study was undertaken in three South Indian states, Andhra Pradesh, Karnataka and Telangana, by application of a survey in 2015–2016. Three districts each in Andhra Pradesh (Anantapur, Guntur and East Godavari), Karnataka (Bidar, Chitradurga and Shivamogga) and Telangana (Karimnagar, Khammam and Ranga Reddy) were selected randomly. From each district, 30 VASs were randomly selected to obtain a total of 270 respondents from the three states.

Operationalisation and measurement of variables

Technical competencies: Technical competencies were defined as the basic sets of knowledge, skills, attitudes and behaviours in technical areas that VASs require to provide integrated support services to farmers. The technical competencies were categorised under four areas covered by India's Bachelor in Veterinary Science and Animal Husbandry (BVSc & AH) curriculum that VASs need to be familiar with to perform tasks well: (a) basic bio-veterinary competencies (Anatomy, Physiology and Biochemistry), (b) production competencies (Animal Nutrition, Animal Genetics, Livestock Production and Management [LPM], Livestock Products Technology [LPT], Poultry and Dairy), (c) para-clinical competencies (Microbiology, Pharmacology, Parasitology and Pathology), and (d) clinical competencies (Surgery, Medicine and Gynaecology).

Application of technical competencies: This was defined as the ability of VASs to demonstrate the application of technical competencies in their work, understand new technologies and associated risks, and refer to and make use of technical publications.

A questionnaire comprising five items was administered to assess the competencies. While keeping in mind their day to day work, the respondents were asked to rate the above competencies on:

- A. How important are these competencies, on a 1 to 5 scale?
1 = not important; 2 = somewhat important; 3 = average;
4 = important; 5 = very important
- B. Their current level of knowledge and/or skills to perform each task, on a 1 to 5 scale: 1 = very low; 2 = low;
3 = moderate; 4 = high; 5 = very high.

To determine any difference between the two means, the independent sample *t*-test was applied.

Appropriate ways to acquire core competencies: This was defined as the perception of VASs regarding methods used to acquire the competencies through pre-service, in-service and basic induction training and by

participating in seminars and workshops. The respondents were asked to rate these on a four-point Likert scale (not appropriate, somewhat appropriate, appropriate, very appropriate, with scores of 1, 2, 3 and 4, respectively). The responses were tabulated using frequencies and percentages.

Additional competencies required: The respondents were asked using open-ended questions to name additional competencies, if any were needed, that were not covered in the study.

Recommended activities to enhance core competencies: The respondents were asked, using open-ended questions, to recommend activities or programmes to enhance competencies among VASs.

Data collection and analysis: The questionnaire covering all the items was developed and pre-tested with 28 participants of the National Workshop on ‘Capacity Needs Assessment of Extension Advisory Service Providers’ held on 6–7 October 2015, in Hyderabad, India. Based on the pre-testing experience, the questionnaire was modified and duplicated for data collection. Data were collected from the VASs during their monthly meetings in district headquarters. The data obtained were coded, entered into a computer spreadsheet and analysed using the Statistical Package for Social Sciences, version 17.0 (14).

Results and discussion

Technical competencies

Among the technical competencies, the mean scores for the importance of each competency, for production (4.29), para-clinical (3.63) and clinical (4.28) competencies, were significantly higher than their corresponding mean scores (3.67, 3.41 and 3.74) for ‘current level of knowledge and/or skills to perform’. However, the mean scores on basic bio-veterinary competencies revealed a non-significant difference. The mean score for the importance of overall technical competencies (15.51) was significantly higher than the current level of knowledge and/or skills to perform the tasks (14.09) (Table I).

Insert Table I here

The results for technical competencies revealed that VASs need more pre-service and in-service training on improving production competencies (Animal Nutrition, LPM, LPT, Poultry and Dairy), para-clinical competencies (Microbiology, Pharmacology, Parasitology, Pathology) and clinical competencies (Surgery, Medicine, Gynaecology).

The Royal College of Veterinary Surgeons (11) in the United Kingdom has prescribed essential technical competencies to be achieved in pre-service training as part of the curriculum under three main areas, and these are reflected in both the 'day one' and the 'year one' requirements as:

- general professional competencies and attributes, describing the distinguishing characteristics of a veterinarian
- underpinning knowledge and understanding, describing in general terms the breadth of knowledge and understanding needed for a career as a veterinarian, and for subsequent professional development in whatever sphere of veterinary science the individual wishes to pursue
- practical based veterinary competencies, describing the basic practical competencies that are expected *a)* at the point of graduation, and *b)* following an extended period of further professional training in practice.

Though the main emphasis of animal husbandry departments (AHDs) in Indian states has been on production, diagnostic and curative animal health services, the results of this study revealed a significant gap between the importance of these competencies and the current level of knowledge and/or skills to perform the tasks among VASs in India. This suggests the need for more pre-service and in-service training on production, para-clinical and clinical competencies in order to provide integrated support services to farmers.

Application of technical competencies

The mean scores for the importance of each competency, for application of all five technical competencies, were higher than their corresponding

mean scores for current level of knowledge and/or skills to perform the tasks, with a significant difference for all of them. Also, the mean score for the importance of overall application of the competencies (19.86) was significantly higher than that for the current level of knowledge and/or skills to perform the competencies (17.30) (Table II).

Insert Table II here

The results revealed that VASs need more refresher training on the application of specific subject matter competencies in their work. The identified capacity-building areas in the application of technical subject matter for field veterinarians included: utilisation of livestock by-products, value chain development, regulations on food safety, sanitary and phyto-sanitary (SPS) measures standards and certification, entrepreneurship and market intelligence, diagnostic kits and laboratory techniques, specialisation in application of clinical skills, reducing livestock-associated greenhouse gas emissions and fodder crisis management (3).

Appropriate ways to acquire the core competencies

More than 50% of the respondents considered all four methods, pre-service training, in-service training, basic induction training and seminars both at national and international level, as appropriate ways to acquire the core competencies. Similarly, a considerable percentage of respondents also perceived all these methods to be appropriate at some level, indicating thereby that these methods could be employed to enhance their core competencies (Table III).

Insert Table III here

The World Organisation for Animal Health (OIE) Guidelines on the Veterinary Education Core Curriculum (15) recommend acquiring core competencies through pre-service training. Also, the Indian course curriculum of the BVSc & AH covers most of the core competencies assessed in this study during pre-service training (16, 17). The minimum competencies have to be defined in the learning objectives of each course, so that these outcomes can be used in design and management of

the undergraduate veterinary curriculum. Providing students, staff and the profession with explicit statements on the day-one competencies required enables all stakeholders to work towards the common goal of ensuring that these skills are delivered through pre-service training (18).

Additional competencies

The respondents suggested some additional competencies that VASs need to perform their day to day activities but that were not covered in the study. They are summarised in Box 1.

Insert Box 1 here

Recommended activities to enhance core competencies

The respondents suggested activities and programmes to enhance core competencies, which are summarised in Box 2.

Insert Box 2 here

Conclusions and recommendations for policy

The study assessed core competencies of field veterinarians in three Indian states, with twin objectives: (a) to assess the competencies of veterinarians in technical subject matter, and their application, and (b) to suggest activities and appropriate ways to acquire and enhance competencies. The findings lead to the conclusion that the core competencies of veterinarians are inadequate to provide three types of integrated support services to farmers: delivery of technical services, making available and providing access to input services, and livestock extension and advisory services. The ratings by respondents and overall analysis of the results point to the conclusion that veterinarians are aware how important these core competencies are and what level of knowledge and/or skills they currently possess to perform the required competencies. Keeping this in view, and in order to bridge the gap in competencies, the following specific policy interventions are recommended.

Improving competencies through pre-service training

There are significant advantages to incorporating accurately defined competency outcomes in the BVSc & AH curriculum in veterinary colleges. Once the minimum competencies have been defined, these outcomes can be used to design a veterinary curriculum for effective pre-service training. Providing explicit statements to students and faculty on the expected competencies enables them to achieve these competencies through pre-service training (18). At a global level, the OIE guidelines (15) also recommend acquiring core competencies through pre-service training. To help improve competencies through pre-service training/undergraduate training, the VCI and veterinary colleges together should develop a system of evaluation or accreditation of the colleges, like those in Europe and North America, as per the guidelines of the OIE.

National veterinary licensing examination

The requirements for licensure to practise veterinary medicine in India are the completion of the BVSc & AH, internship and registration with the VCI or with respective state veterinary councils. India's BVSc & AH curriculum, which is the same for the entire country, includes most of the core competencies assessed in this study. However, infrastructure, faculty strength and exposure of students to clinical cases vary among veterinary colleges in the country. Therefore, the concern is to achieve equivalent and effective pre-service training and hands-on instruction in different Indian veterinary colleges. To confirm the competencies and introduce uniformity, it is recommended to conduct a national veterinary licensing examination for proper assessment of competencies before licensure.

Improving competencies through induction and in-service training

Basic education and refresher/in-service training courses are the main, and in most cases the only, forms of veterinary capacity development in India. Though the country has several agencies involved in the training of extension personnel, most of the focus has been on crop development. Infrastructure for training for livestock development is considerably weaker (19). The Planning Commission of India (20) also emphasised

that it is paramount for field veterinarians to be re-trained to address recent developments and that they should attend mandatory refresher courses every five years during their careers. To provide induction and in-service training in technical areas to field veterinarians, the AHDs have regional training centres in each state. In addition, veterinary colleges and animal science research institutes are also providing in-service technical training programmes, to a limited extent. To strengthen in-service training, there is a need to establish regional academic staff colleges exclusively to increase the skills and competence of field veterinarians; this was also recommended in an earlier study (3). Further infrastructure and faculties in the existing training centres of AHDs need to be strengthened to impart need-based technical skills to field veterinarians at a local level.

Competency development through continuing veterinary education

Adequate mechanisms for capacity building through continuing veterinary education (CVE) programmes do not exist in India at present. Among field veterinarians, the demand for capacity building is related to knowledge and competencies in new or frontier areas. Some of the additional competencies identified in this study were also reported in several earlier reports:

- understanding the transition in livestock production systems – a shift in focus from grazing to stall feeding, from social to economic issues, and from backyard to commercial/contract farming (21, 22, 23)
- increasing demand for livestock products, adding value, trade in livestock products, SPS standards (3, 24, 25)
- feed and fodder scarcity, crop-residue feeding and associated greenhouse gas emissions from livestock, increasing costs of inputs and labour, emerging diseases and lack of expertise in very specialised clinical subjects (8, 26, 27)

- the changing role of veterinarians and the information needs of livestock farmers (6, 7, 22, 25).

To meet the evolving challenges confronting the livestock sector, field veterinarians need to acquire new competencies by attending CVE programmes on topics identified in this study, among others.

To supplement on-campus skill oriented CVE training programmes, distance learning methodologies need to be adopted to impart knowledge-based CVE programmes. Distance education can increase the capacity of current facilities and faculty and provide increased flexibility, convenience and high-quality technology-enabled learning experiences. It also allows VASs to acquire knowledge more cheaply while still maintaining their employment (28, 29, 30).

Improving the institutional mechanisms for core competencies

The recommended institutional mechanisms or programmes needed to enhance core competencies are: assessment of core competencies at regular intervals to identify capacity gaps and training needs, better infrastructure at regional training centres and veterinary hospitals with support staff, more frequent meetings, training programmes, exposure visits, workshops and webinars, CVE programmes on technical subjects, delinking of extension work and technical services and developing an online multimedia manual on core competencies. In all these cases the emphasis must be on quality rather than on the number of programmes. The training organisers must be effective in imparting their skills and developing positive attitudes among veterinarians, rather than on improving knowledge alone. In addition, proper coordination is required among AHDs, veterinary colleges and animal science research institutes involved in capacity building of field veterinarians.

If implemented, the above policy actions would be useful in strengthening the competencies of veterinarians and improving the effectiveness of overall veterinary service delivery across India.

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Table I
Technical competencies

| Technical competencies | How important is this competency?* | | Current level of knowledge and/or skills to perform the tasks** | | t value | Significance (2-tailed) |
|--|------------------------------------|------|---|------|---------|-------------------------|
| | Mean | SD | Mean | SD | | |
| Basic bio-veterinary competencies (anatomy, physiology, biochemistry) | 3.31 | 1.27 | 3.27 | 0.73 | 0.46 | 0.647 |
| Production competencies (animal nutrition, LPM, LPT, poultry and dairy) | 4.29 | 0.76 | 3.67 | 0.72 | 9.70 | 0.000 |
| Para-clinical competencies (microbiology, pharmacology, parasitology, pathology) | 3.63 | 1.05 | 3.41 | 0.71 | 2.87 | 0.004 |
| Clinical competencies (surgery, medicine, gynaecology) | 4.28 | 0.89 | 3.74 | 0.76 | 7.61 | 0.000 |
| Overall technical competencies | 15.51 | 3.07 | 14.09 | 2.24 | 6.15 | 0.000 |

* Scale values: 1 = not important; 2 = somewhat important; 3 = average; 4 = important; 5 = very important

** Scale values: 1 = very low; 2 = low; 3 = moderate; 4 = high; 5 = very high

LPM: livestock production and management

LPT: livestock products technology

SD: standard deviation

Table II
Technical subject matter application competencies

| Technical subject matter application competencies | How important is this competency?* | | Current level of knowledge and/or skills to perform the tasks** | | t value | Significance (2-tailed) |
|--|------------------------------------|------|---|------|---------|-------------------------|
| | Mean | SD | Mean | SD | | |
| Demonstrate basic knowledge in discipline | 3.60 | 1.09 | 3.36 | 0.64 | 3.08 | 0.002 |
| Understand the new technology being promoted (i.e. what it is, why and how it works) | 4.06 | 0.80 | 3.51 | 0.64 | 8.75 | 0.000 |
| Be able to educate community members about different types of risk and uncertainty (due to climate change, market fluctuations, disasters) | 4.20 | 0.75 | 3.54 | 0.72 | 10.29 | 0.000 |
| Refer to and make use of publications – journals, research reports, etc. | 4.07 | 0.82 | 3.56 | 0.70 | 7.76 | 0.000 |
| Demonstrate basic knowledge of livestock businesses, and help entrepreneurship development among clientele | 3.94 | 0.92 | 3.32 | 0.75 | 8.47 | 0.000 |
| Overall technical subject matter application expertise | 19.86 | 3.08 | 17.30 | 2.50 | 10.62 | 0.000 |

* Scale values: 1 = not important; 2 = somewhat important; 3 = average; 4 = important; 5 = very important

** Scale values: 1 = very low; 2 = low; 3 = moderate; 4 = high; 5 = very high

SD: standard deviation

Table III
Appropriate ways to acquire the core competencies

| Appropriate ways to acquire core competencies | Not appropriate | Somewhat appropriate | Appropriate | Very appropriate |
|--|-----------------|----------------------|-------------|------------------|
| | F (%) | F (%) | F (%) | F (%) |
| Pre-service training (e.g. undergraduate/postgraduate education in veterinary colleges) | 10 (3.7) | 7 (2.6) | 147 (54.4) | 106 (39.3) |
| In-service training (e.g. training offered in AHDs, veterinary colleges, extension education institutes, ICAR institutes, administrative staff colleges, etc.) | 0 (0) | 24 (8.9) | 161 (59.6) | 85 (31.5) |
| Basic induction training | 2 (0.7) | 49 (18.1) | 152 (56.3) | 67 (24.8) |
| National and international seminars, workshops, webinars, etc. | 37 (13.7) | 48 (17.8) | 126 (46.7) | 59 (21.9) |

AHDs: animal husbandry departments
 ICAR: Indian Council of Agricultural Research
 F: frequency

Box 1

Additional competencies

- Time management skills
- Stress management
- Motivational techniques
- Digital communication technologies
- Writing and oratory skills
- Priority setting methods
- Performance appraisal methods
- Strengths, weaknesses, opportunities and threats (SWOT) analysis
- Team work and group dynamics
- Value chain and market analysis
- Policy facilitation
- Economics and business management
- Legislation related to veterinary medicine and animal husbandry

Box 2

Recommended activities/programmes to enhance core competencies

- Assessment of core competencies at regular intervals
- Better infrastructure at regional capacity-building centres
- Basic infrastructure development at veterinary hospital level to match the competencies
- Provision of support staff in each veterinary hospital to utilise existing competencies
- More frequent meetings at divisional or district level for knowledge sharing
- More frequent training, exposure visits, workshops and webinars to enhance core competencies at regional, national and international levels
- Continuing veterinary education (CVE) programmes on advanced animal production, para-clinical and clinical competencies
- Provision of audio-visual aids to each field level institution for effective extension work
- Extension work and technical services to be delivered by separate veterinarians at field level
- Online multimedia manual on core competencies