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ASSESSMENT OF CORE COMPETENCIES OF LIVESTOCK EXTENSION PROFESSIONALS IN INDIA

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July 2016



MICHIGAN STATE
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Assessment of Core Competencies of Livestock Extension Professionals in India

Submitted to
Modernizing Extension and Advisory Services (MEAS)
213 Mumford Hall, MC 710
1301 W. Gregory Drive, Urbana, IL 61801-3605, USA

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July 2016

Front cover photograph:

Rajiv Gandhi Institute of Veterinary Education and Research, Puducherry.

Back cover photograph:

Left: Dr. S.M. Sandani Basha, Veterinarian, Guntur District, Andhra Pradesh, Discussing Case History with a Woman Farmer.

Right: Veterinary Health Camp by College of Veterinary Science, Shivamogga, Karnataka.

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Suggested Citation:

Sasidhar, P.V.K. & Suvedi, M. (2016). Assessment of core competencies of livestock extension professionals in India. Urbana, IL: USAID-Modernizing Extension and Advisory Services (MEAS). www.meas.illinois.edu

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This report was prepared as part of the United States Agency for International Development (USAID) Modernizing Extension and Advisory Services (MEAS) project.

The report was made possible by the generous support of the American people through USAID. The contents are the responsibility of the authors and do not necessarily reflect the views of USAID, the United States Government, Michigan State University, Indira Gandhi National Open University or the Government of India.

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ACRONYMS

Ag. GDP	Agricultural Gross Domestic Product
AHD	Animal Husbandry Department
ATMA	Agricultural Technology Management Agency
BVSc & AH	Bachelor of Veterinary Science and Animal Husbandry
CRISP	Centre for Research on Innovation and Science Policy
CVE	Continuing Veterinary Education
EAS	Extension Advisory Services
EEl	Extension Education Institute
FGD	Focus Group Discussion
FLD	Front Line Demonstrations
GDP	Gross Domestic Product
ICAR	Indian Council of Agricultural Research
ICT	Information and Communication Technology
IGNOU	Indira Gandhi National Open University
MSU	Michigan State University
KVK	<i>Krishi Vigyan Kendra</i>
LPM	Livestock Production and Management
LPT	Livestock Products Technology
MANAGE	National Institute of Agricultural Extension Management
MEAS	Modernizing Extension and Advisory Services
ND	New Castle Disease
NEP	National Extension Program
NGO	Non Governmental Organization
NSSO	National Sample Survey Organization
OFT	On-farm Trial
OIE	<i>Office International des Epizooties</i> (World Organization for Animal Health)
PPP	Public Private Partnership
PRA	Participatory Rural Appraisal
RCVS	Royal College of Veterinary Surgeons
RRA	Rapid Rural Appraisal
SAMETI	State Agricultural Management and Extension Training Institute
SAUs	State Agricultural Universities
SHG	Self Help Group
SPSS	Statistical Package for Social Sciences
SVUs	State Veterinary Universities
SWOT	Strengths, Weaknesses, Opportunities and Threats
USAID	United States Agency for International Development
VAS	Veterinary Assistant Surgeon
VCI	Veterinary Council of India
VO	Veterinary Officer

ACKNOWLEDGEMENTS

The report was made possible by the generous support of the American people through USAID – MEAS project. The study could not have been carried out without the support of the following project contact persons for data collection in Andhra Pradesh, Karnataka and Telangana states of India.

- Dr. S. M. Sandani Basha, Veterinary Assistant Surgeon, Kakumanu, Guntur District (Andhra Pradesh).
- Dr. Mula Ravikumar, Scientist, Buffalo Research Station, Venkataramannagudem, West Godavari District (Andhra Pradesh).
- Dr. Reddy Vara Prasad, Veterinary Assistant Surgeon, Regional Animal Husbandry Training Centre, Reddypalli, Ananthapur District (Andhra Pradesh).
- Dr. G. T. Gopala, Assistant Professor, Department of Veterinary and Animal Husbandry Extension, Veterinary College, Shivamogga (Karnataka).
- Dr. Channappagouda Biradar, Assistant Professor, Department of Veterinary and Animal Husbandry Extension, Veterinary College, Bidar (Karnataka).
- Dr. C. Uma, Assistant Director, Veterinary Biological Research Institute, Hyderabad (Telangana).
- Dr. A. Harish, Veterinary Assistant Surgeon, Mudigonda, Khammam District (Telangana).
- Dr. S. Sridhar, Veterinary Assistant Surgeon, Regional Animal Husbandry Training Centre, Karimnagar (Telangana).
- Ramjee Ghimire, Ph.D. Scholar, Department of Community Sustainability, Michigan State University.

Authors gratefully acknowledge the support received from the officials of the Modernizing Extension and Advisory Services project, especially Andrea Bohn, Indira Gandhi National Open University and Michigan State University.

Authors would like to thank all the respondents of the study who graciously gave their time and inputs. Warm thanks and appreciation go to Dr. Shruti Sethi, Senior Scientist, ICAR-IARI, New Delhi, Shri Sanjay Nagpal, Senior Personal Assistant and Shri. Manish Kumar, Junior Assistant Cum Typist, SOEDS, IGNOU, New Delhi who helped in over 48,600 data entries into SPSS grid.

Authors are grateful to Dr. S.V.N. Rao, Professor & Head (Retd.), Department of Veterinary and Animal Husbandry Extension, Rajiv Gandhi Institute of Veterinary Education and Research, Puducherry and Dr. V. Rasheed Sulaiman, Director, Centre for Research on Innovation and Science Policy, Hyderabad for their helpful comments on the draft report.

The authors alone accept responsibility for any shortcomings or factual errors in this report.

EXECUTIVE SUMMARY

This USAID-funded MEAS project assessed core competencies of livestock extension professionals in India with the following research questions:

- Do livestock extension professionals possess core (process and technical) competencies in order to provide integrated support services to the farmers?
- Are the livestock extension professionals aware how important these core competencies are and at what level do they have the knowledge and or skills to perform the required tasks?
- What are the activities or programs required and what are the appropriate ways to enhance core competencies among livestock extension professionals?

The study was undertaken in three South Indian states, namely: Andhra Pradesh, Karnataka and Telangana. The data, collected in 2015-16 from nine districts in the three states, came from in-depth questionnaires filled by 270 Veterinary Assistant Surgeons (VASs), who are the middle level livestock extension professionals. The key survey questions were on ten core areas viz., specific livestock extension and subject matter competencies, technical subject matter application competencies, livestock extension program development, implementation and evaluation competencies, communication, education and informational technology competencies, personal, professional development and diversity competencies. The respondents rated the competencies on (a) how important are these competencies and (b) what is the current level of knowledge and/or skills to perform each competency. In addition, data were also collected on appropriate ways to acquire core competencies, additional competencies needed and recommend activities / programs to enhance core competencies.

The key findings are:

- Livestock extension professionals' current level of knowledge and/or skills are inadequate in specific extension competencies viz., extension teaching / training methods, audio visual aids, data collection tools, needs assessment, participatory tools, monitoring and evaluation competencies.
- Livestock extension professionals need more in-service training to improve production, para-clinical and clinical competencies and application of these specific technical competencies in extension work.
- Livestock extension professionals need to acquire more competencies in extension program planning, implementation, evaluation, communication, personal and professional development and diversity areas.
- Livestock extension professionals have more knowledge and/or skills in education and ICT competencies than their current level of use / scope in their day to day job.
- Pre-service, in-service and basic induction trainings, attending national and international seminars, workshops and webinars' are appropriate to very appropriate ways to acquire the core competencies.
- Time management, stress management, motivational techniques, digital communication technologies, writing and orator skills, priority setting and performance appraisal methods, SWOT analysis, team work and group dynamics, value chain and market analysis, policy facilitation, economics, business management, and legislations on veterinary and animal husbandry are the additional competencies that livestock extension professionals perceived as needed in addition to the competencies surveyed.

The findings revealed that except the ICT related competencies, in all other nine competencies the extension professionals' current level of knowledge and /or skills are significantly lower compared to their importance in day to day work. Therefore, their competencies need to be enhanced in the areas viz., specific extension methods and tools; technical subject matter; extension program development, implementation and evaluation; communication; personal and professional development, and; diversity issues. *This leads to the conclusion that core (process and technical) competencies of livestock extension professionals are inadequate to provide integrated support services to the farmers viz. (i) livestock extension and advisory services (to enrich the knowledge and improve the skills of livestock farmers) (ii) to make available and access to input service such as semen, vaccines, medicines, equipments, instruments, feed etc. (to augment production and productivity) and,*

(iii) delivery of the technical services (clinical and para-clinical health care of livestock).

The observed pattern of qualitative growth in crossbred dairy cows, improved breeds of buffaloes, sheep, pigs and poultry as revealed by latest Livestock Census indicates a shift towards economically more efficient species. This shows that the livestock sector of India is both expanding and adapting to emerging socioeconomic, environmental and technological forces, with direct implications for effective integrated livestock extension advisory service (EAS) delivery. To provide the integrated support efficiently, livestock extension professionals need to possess or acquire core competencies in extension as well as technical subject matter. In this context, livestock extension professionals need to be more knowledgeable, and need to possess a set of core competencies — both process and technical skills. *The rating of respondents and overall analysis of the results point to the conclusion that the livestock extension professionals are aware how important these core competencies are. They are also aware that their current levels of competencies are inadequate to perform their tasks effectively.*

The recommended activities or programs to enhance core competencies among livestock extension professionals are: assessment of core competencies at regular intervals, better infrastructure at regional training centers and hospitals with supporting staff, more frequent meetings, trainings, exposure visits, workshops and webinars, continuing veterinary education programs on technical subjects, and developing an online manual on livestock extension competencies. More or less the respondents perceived that 'pre-service, in-service and basic induction trainings as well as national and international seminars, workshops, webinars as appropriate to very appropriate ways to acquire the core competencies.

To fill the gap and acquire core competencies by livestock extension professionals, following specific policy interventions at different levels of training are suggested and discussed.

- Improving competencies through hands-on pre-service instruction in veterinary colleges and proper assessment of competencies before certification.
- Improving competencies through basic induction and in-service training by establishing regional academic staff colleges and by strengthening existing training centers of AHDs.
- Competency development through continuing veterinary education programs.
- Improving the institutional mechanisms to assess core competencies at regular intervals and to identify capacity gaps.

CHAPTER 1 - INTRODUCTION

Livestock sector is one of the fastest growing segments of the agriculture in India. Livestock have been an integral component of India's agricultural and rural economy since time immemorial, supplying milk, meat, draught power and organic manure for crop production, and in turn deriving their own energy requirements from crop byproducts and residues. The mechanization in agriculture, however, has weakened the synergy between livestock and crops. Livestock are now more valued as source of food and contribute nearly one-fourth to the agricultural gross domestic product (Ag.GDP) and engage about 9% of the agricultural labor force (Planning Commission, 2012a).

1.1. IMPORTANCE OF LIVESTOCK SECTOR TO NATIONAL ECONOMY

India's livestock sector is one of the largest in the world. It has 56.7% of world's buffaloes, 12.5% cattle, 20.4% small ruminants, 2.4% camel, 1.4% equine, 1.5% pigs and 3.1% poultry. In terms of numbers, in 2012, the country had a livestock population of 512.05 million and a poultry population of 729.2 million – an increase of 12.39% over the previous census. The livestock census also revealed a significant increase in the number of dairy animals (cows and buffaloes) from 111.09 million in 2007 to 118.59 million in 2012. Whereas, the goat, sheep, and pig populations registered a decline of 3.82%, 9.07% and 7.54%, respectively, compared to the previous census. However, in the case of sheep and pigs, the crossbred population had increased by 1.37% and 2.80%, respectively (Livestock Census, 2012).

Livestock sector grew at an annual rate of 5.3% during 1980s, 3.9% during 1990s and 3.6% during 2000s. Despite deceleration, growth in livestock sector remained about 1.5 times larger than in the crop sector which implies its critical role in cushioning agricultural growth. 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 Ag.GDP (Livestock Census, 2012; National Accounts Statistics, 2012; Planning Commission, 2012a). This indicates that livestock sector is emerging as an engine of growth in the agricultural sector.

India has the largest number of families depending on livestock rearing to supplement family income and generates gainful employment in rural areas, particularly among the landless laborers, small and marginal farmers. Distribution of livestock is more equitable compared to that of land. Marginal farm households (less than 1.0 hectare of land) who comprised 48% of the rural households control more than half of country's cattle and buffalo, two-thirds of small ruminants (goat, sheep) and pigs as well as poultry as against their share of 24% in land. Livestock contributed 16% to the income of small farm households as against an average of 14% for all rural households. The growth in livestock sector is demand-driven, inclusive and pro-poor. Incidence of rural poverty is less in states like Punjab, Haryana, Jammu & Kashmir, Himachal Pradesh, Kerala, Gujarat, and Rajasthan where livestock accounts for a sizeable share of agricultural income as well as employment (Planning Commission, 2012a). Research showed that livestock rearing has positive impact on equity in terms of income, employment and poverty reduction in rural areas (Singh and Hazell, 1993; Thornton et al., 2002; BIRTHAL and Ali, 2005; and Rangnekar, 2014a).

1.2 RATIONALE FOR THE STUDY AND RESEARCH QUESTIONS

The observed pattern of growth in crossbred dairy cows, improved breeds of buffalo, sheep, pigs and poultry as revealed by latest Livestock Census (2012) indicates a shift towards economically more efficient species. In the case of bovines, the incremental growth is less in populations of males compared to females, mainly because animal draught power is being replaced with mechanical power and the emphasis was on milk production. In the case of poultry, broiler production has been more vibrant than layer production in terms of annual growth. This shows that the livestock sector of India is both expanding and adapting to emerging socioeconomic, environmental and technological forces, with direct implications for livestock Extension Advisory Services (EAS) delivery (Rao et al., 2015).

Although the livestock sector is registering phenomenal growth, several challenges remain unaddressed. Some of these include: a shortage in the number of veterinary assistant surgeons (VASSs), who are the middle level livestock extension professionals (Rama Rao et al., 2011; Anon., 2012; Anon., 2013; Sasidhar and Reddy, 2013; Rao et al., 2015), poor collaborative extension – research linkages (Balaguru and Rajagopalan, 1986; Eponou, 1993; Rao et al., 2015), and inadequate competencies among livestock extension professionals (Matthewman

and Ashley, 1996; Delgado et al., 1999; Ahuja et al., 2000; Chander et al., 2010; Hegde, 2010; SAPPLPP, 2012). Livestock production systems and practices are changing, and farmers' needs are changing, too. Farmers are increasingly aware of new technologies and improved practices. They are demanding credible information about the benefits of adopting these improved practices. Competencies of livestock extension functionaries need to be enhanced to handle the challenges and meet the expectations of farmers. The Indian Planning Commission also stressed the importance of developing new competencies among extension professionals and recommended annual competency assessment of every extension personnel to identify capacity gaps and training needs (Planning Commission, 2012b).

Overall the livestock extension functionaries need to address the above challenges and provide following three types of integrated support to the farmers (Rao and Natchimuthu, 2015):

- i. Livestock extension and advisory services (to enrich the knowledge and improve the skills of livestock farmers).
- ii. To make available and access to input services such as semen, vaccines, medicines, equipments, instruments, feed etc. (to augment production and productivity) and,
- iii. Delivery of the technical services (clinical and para-clinical health care of livestock).

To provide the integrated support efficiently, livestock extension professionals need to have or acquire core competencies in extension as well as technical subject matter. Farmers expect the support to be responsive to customer-expressed needs - that is customer-driven. These challenges put pressure on livestock extension professionals to be more knowledgeable, skillful and able, not only in technical subject matter but also in process skill competencies. Livestock extension professionals should remain current with emerging technologies, be able to handle challenges, tap opportunities and demonstrate competency in their services. They need to possess a set of core competencies — both process and technical skills (Suvedi and Kaplowitz, 2016).

Though huge emphasis has been there on the core competencies of livestock extension professionals, the following research questions still need to be answered:

- Do livestock extension professionals possess core (process and technical) competencies in order to provide integrated support services to the farmers?
- Are the livestock extension professionals aware how important these core competencies are and at what level do they have the knowledge and or skills to perform the required competencies?
- What are the activities or programs required and what are the appropriate ways to enhance core competencies among livestock extension professionals?

To answer the above questions, this study on 'Assessment of Core Competencies of Livestock Extension Professionals in India' was conducted with the following objectives.

1.3 OBJECTIVES

- To assess the core (process and technical) competencies of livestock extension professionals.
- To suggest the activities and appropriate ways to acquire and enhance core competencies among livestock extension professionals.

1.4 LAYOUT OF THE REPORT

The report is organized into five chapters. The introductory chapter gives an overview of the India's livestock sector and gives the rationale for the study with research questions and objectives of the study. The second chapter on theoretical orientation discusses livestock extension system, its functions, challenges, and core competencies in livestock extension. The third chapter describes methods used in the process of investigation with details on study locale, sampling, operationalization and measurement of variables, data collection, analysis and limitations of the study. The fourth chapter focuses on the results and discussion. The conclusions and policy implications of the study are highlighted in the fifth chapter. Literature cited and the instrument used for data collection are appended at the end.

CHAPTER 2 – CORE COMPETENCIES IN LIVESTOCK EXTENSION - THEORETICAL ORIENTATION

2.1. LIVESTOCK EXTENSION IN INDIA

Livestock extension is a diverse, valuable and a relatively new operational concept in India, and its role in veterinary and animal science research and development is not clearly understood by many. The livestock extension follows general trends set by agricultural extension with substantial changes for various stakeholders, subject matter, technologies to be transmitted, funding and staffing.

In 1950s, livestock extension activities were a part of the National Extension Program (NEP). But the emphasis of NEP gradually shifted more towards crop sector, and activities related to livestock extension were transferred to animal husbandry departments (AHDs) in the states, which were not able to render justice to extension activities due to shortage of trained staff. In the subsequent decades, livestock infrastructure and manpower in the public sector expanded considerably. Yet, livestock extension activities remained grossly neglected and were covered under the umbrella of broad agricultural extension (Birthal et al., 2006).

At present, livestock extension system in India includes all public and private livestock related institutions that transfer, mobilize and educate livestock owners and is distinct from a service or single institution that traditionally provide advice only. The four major organizational streams devoted to livestock extension in India are:

First level extension system – comprising mainly central ministry / department of animal husbandry and dairying; Indian Council of Agricultural Research (ICAR) and its constituent animal science research institutes, Veterinary Council of India (VCI); National and State Institutes for Livestock Development; and State Veterinary Universities (SVUs) / State Agricultural Universities (SAUs), Agricultural Technology Management Agency (ATMA) and *Krishi Vigyan Kendras* (KVKs).

Second or middle level extension system – comprising mainly AHDs and their functionaries. The Veterinary Assistant Surgeons (VASs) or Veterinary Officers (VOs) are crucial middle level livestock extension professionals working at grass root level under AHDs.

Third level extension system – comprising mainly village level livestock extension workers under AHDs.

Fourth level extension system – Livestock extension work by NGOs, voluntary organizations, business and corporate houses like livestock pharmaceuticals, feed and other input providers.

2.2. FUNCTIONS OF LIVESTOCK EXTENSION

The functions that livestock extension plays in livestock development depend on how one defines livestock extension. By applying Van den Ban and Hawkins (1998) definition of agricultural extension, we may arrive at a concept of livestock extension that synthesize diverse perspectives of livestock sector into five functions:

- Transferring knowledge from researchers to livestock farmers.
- Advising livestock farmers in their decision making.
- Educating livestock farmers to be able to make informed decisions in future.
- Enabling livestock farmers to clarify their own goals and possibilities and to realize them.
- Stimulating sustainable livestock and rural developments.

However, the above definition covers only extension competencies. In the field conditions, VASs who are the crucial middle level livestock extension functionaries need to provide input services to augment production and healthcare services in addition to extension educational and information services (Rao and Natchimuthu, 2015).

Stimulating sustainable livestock development should be the most common function of livestock extension

system. Besides this, livestock extension also serves policy makers, researchers, input suppliers, and consumers of livestock products with timely information about emerging needs and issues facing production, processing, and marketing.

2.3. CHALLENGES IN LIVESTOCK EXTENSION

Livestock extension advisory services remained grossly neglected and were covered under the umbrella of broad agricultural extension. Livestock extension programs covered under broad agricultural extension have been reviewed by several researchers, identified quite a lot of limitations and suggested interventions (Rollings, 1989; Bhattacharya and Jhansi Rani, 1995; Mathewman and Ashley, 1996; Shakir et al., 1999; Birthal et al., 2006; Chander et al., 2010; Rao et al., 2011; Ravikumar and Chander, 2011; Chander et al., 2013; Ramkumar, 2014; Rangnekar, 2014b; Rao and Natchimuthu, 2014 and 2015). They are summarized under the following broad areas.

Inadequate Livestock Extension Services: Livestock extension service delivery system promoted by public sector often provides a limited support to small holder livestock farmers, latter seeking alternatives for rescuing them from hardships. This assumes more significance in the prevailing scenario of globalization and liberalization, with the consequence of opened economy. Of late private or public-private partnership (PPP) interventions were found effective in providing these services, prompting governments to encourage, legalize and regularize these service providers. For example, with the participation of private sector, poultry extension advisory and other support services have reached to every individual commercial poultry farmer in the country with efficiency and effectiveness (Sasidhar and Suvedi, 2015). Shortage in the numbers of middle and lower level livestock extension functionaries in AHDs is adding to the burden and affecting the competencies of existing functionaries (Box 1).

Commodity Approach Instead of Farming Systems Approach: Livestock production is an integral and interdependent part of mixed farming system. Livestock extension needs to concentrate on increasing the effective use of different sub-systems by adopting a farming systems extension approach rather than commodity approach (Rangnekar, 2014b).

High Input Oriented Research Outputs: On par with research outputs, livestock extension advises are also high input oriented while 'low external input production systems' prevailing with landless, marginal and small farmers.

Example: Crossbreeding and associate negative consequences.

Box 1. Middle and Lower Level Livestock Extension Workers in South India

State	Veterinary Assistant Surgeons (Middle level livestock extension functionaries)			Para-Veterinarians (Lower level livestock extension functionaries)		
	In position	Required	Occupancy %	In position	Required	Occupancy %
Karnataka	1940	2950	65.76	4950	6220	79.58
Tamil Nadu	1931	2960	65.23	1156	1590	72.70
Andhra Pradesh*	2652	6220	42.63	5064	6220	81.41
Puducherry	39	44	88.63	63	109	57.80
Kerala	1266	1364	92.81	2668	2902	91.93
Total	7,828	13,527	57.86	13,838	16,932	81.72

Source : Rao et al., 2015

*Undivided Andhra Pradesh

Inadequate Adaptive Research: The on-farm trials (OFTs) and front line demonstrations (FLDs) have to help in assessment and refinement of technologies to fit in livestock keeping by low external input production systems. However, the ICAR / SAUs / SVUs claim on OFTs / FLDs through KVKs and extension directorates mainly confined to crop extension, neglecting livestock extension. Hence, a considerable technological gap still lies between the technology already recommended and the technology adopted by the livestock farmers.

Collaboration – A Missing Link in Effective Livestock Extension Delivery: Every state in India has organizations to support livestock extension service delivery to the farmers. However, it is constrained not due to lack of organizations or programs, but due to inability of the organizations to collaborate with each other in strengthening extension – research linkages (Rao et al., 2015).

Lack of Institutional Shift from Livestock Extension to Livestock Entrepreneurship: Unless the entrepreneurship competencies are added to the livestock extension capabilities, the application of extension may not bear expected results. Currently there is a lack of institutional shift from extension to entrepreneurship in livestock extension activities (Ramkumar, 2014).

Example: Conventional dairy extension (with focus on improving production in terms of unit cost involved in feeding, breeding and management) vis-à-vis Commercial dairy extension (with focus on marketing, market rates, value addition, project formulation, licensing, climate change, pollution control, budgeting, sources of funds, insurance, mechanization, etc.).

Focus on Curative or therapeutic Services than Preventive and Extension Education Services: In livestock extension services, the main emphasis has been on diagnostic and curative health rather than preventive health and education, which is in contrast to the argument, the preventive and extension educational service is more important than diagnostic and curative services (Chander et al., 2010; Chander, 2013; Rao and Natchimuthu, 2015).

Example: A survey of the NSSO (2005) showed that only 5.1% of the households could access animal husbandry information, whereas, the corresponding figure for agricultural sector was 40.5% indicating gross negligence of livestock extension education activities in the country.

Inadequate Policy Support: India is too large and diverse to have a single comprehensive policy for livestock development. Livestock extension priorities need to be set regionally with the involvement of farmers and all other stakeholders. Therefore livestock extension functionaries should be familiar with the vision, mission and goals of extension service and knowledgeable about national livestock development strategies, programs and policies (Rao et al., 2011).

Bias in Livestock Extension Services: Livestock extension services in India are characterized by five biases that result in neglecting poor rural livestock-keepers. First, many organizations follow only a top-down ‘transfer of technology’ approach; Second, focus is mostly on cattle and buffaloes, almost to complete exclusion of other species; Third, focus primarily on milk production, to neglect of other roles of livestock; Fourth, services are usually concentrated in high potential areas and; Fifth, livestock extension is generally provided by men for men, despite key roles that women play in livestock farming (Matthewman and Ashley, 1996).

In the light of the above challenges among others, livestock extension professionals need to possess or acquire core competencies in extension as well as technical subject matter for effective service delivery.

2.4 CORE COMPETENCIES IN LIVESTOCK EXTENSION

There are many definitions of ‘competence’ and many views on how it can be developed and assessed. In general terms, however, competence is a concept that integrates knowledge, skills and attitudes, the application of which enables the professional to perform effectively, and to respond to contingencies, change, and the unexpected (RCVS, 2006). Competence is the ability to perform the roles and tasks required by one’s job to the expected standard (Eraut and Boulay, 2000). This definition recognizes that requirements and expectations change depending on job role and context. It also recognizes that competence develops, and that an individual may work ‘competently’ at many different levels, either at different stages of his or her career, or indeed from

one day to the next depending on the nature of the work (RCVS, 2006).

Athey and Orth (1999) defined core competencies as a collection of observable dimensions —individual skills, knowledge, attitudes, behaviors, and collective processes and capabilities —necessary for individual, organizational and program success. McClelland (1973) argued that being knowledgeable and/or intelligent only does not indicate that a person is an effective and efficient worker — a worker’s performance is a function of his/her knowledge plus skills and attitudes. Hence, extension professionals should not be judged solely on how knowledgeable they are in their technical subject area of expertise but on how skillful and able they are in delivering services to their clients. It should also be noted that core competency needs are contextual, and extension workers’ contexts affect their competency needs and competency levels.

Extension workers should be knowledgeable in the essential competencies required of a New Extensionist (Davis, 2015). To accomplish this it is essential that these requirements be clearly understood by the extension workers. ‘Skills’ are specific activities, and ‘competence’ is the ability to carry out an activity effectively, safely, and efficiently. A competency is a standard: the performance of a skill at a predetermined level of performance (Welsh et al., 2009). The most critical competencies are those that relate to skills that an extension worker is expected to perform.

Based on the functions of livestock extension as defined in the previous section, the competencies required of a livestock extension worker may be classified into two broad categories:

- a. Process skills or functional competencies or soft skills
Example: Networking with local organizations, facilitating group formation, resolving conflict and engaging stakeholders in program planning, etc.
- b. Technical skills
Example: Identifying disease causal organism in dairy cattle, conducting a method demonstration on how to perform artificial insemination in dairy animals etc.

A good livestock extension professional must possess both process and technical skills. Core competencies are basic sets of knowledge, skills, attitudes, and behaviors that livestock extension professionals required to perform their tasks well. Combination of these core competencies with technical knowledge and skills enable livestock extension professionals to be more effective in addressing livestock farmers’ needs.

Sulaiman and Davis (2012), Davis and Sulaiman (2014), Davis (2015), CRISP (2015), Prasad et al.,(2015) while emphasizing capacity development as a long-term investment for extension, articulated the need to develop functional and technical competencies / capacities across three levels:

- a. Individual level
- b. Organization level and,
- c. Enabling environment level.

In this study an attempt was made to assess the core competencies of livestock extension professionals in India at individual level. At individual level, the technical skills and competencies for extension field workers vary by specialization. For example, an extension professional working in the livestock sector needs to have basic technical knowledge and skills in veterinary science and animal husbandry that would differ from their counterparts in crop or home science or fisheries sectors. However, minimum basic extension skills and knowledge are needed and useful for any extension professional irrespective of his or her specialization. Examples of such skills include knowledge on program planning, implementation, evaluation, communication, training and development of a farm business plan based on market analysis etc.

Researchers have proposed many areas of core competencies for extension workers at individual level (Cooper and Graham, 2001; Scheer et al., 2006, Prasad et al., 2015, CRISP, 2015). At individual level, four areas of professional core competencies (Box 2) adequately address the needs of demand-driven, decentralized, pluralistic and participatory extension systems (Suvedi and Kaplowitz, 2016).

Box 2: Professional Core Competencies at Individual Level

a. Program planning

1. Conduct needs assessments
2. Prioritize needs and problems
3. Identify stakeholders and engage them in extension programs
4. Acquire and allocate resources (resource mobilization)
5. Conduct the nominal group technique
6. Conduct community forums
7. Conduct brainstorming exercises
8. Identify market opportunities
9. Design services based on gender analysis
10. Develop a work plan
11. Develop a grant proposal

b. Program implementation

12. Conduct farm and home visits
13. Conduct method and results demonstrations
14. Organize farmer field schools
15. Organize field days
16. Establish a model village
17. Conduct meetings effectively
18. Manage conflict
19. Manage time
20. Manage groups and teamwork
21. Understand group dynamics and/or facilitate groups
22. Write field reports

c. Program evaluation

23. Design survey instruments
24. Conduct surveys and personal interviews
25. Conduct participant observations
26. Conduct rapid rural appraisals (RRA) and participatory rural appraisals (PRA)
27. Conduct focus group discussions (FGD)
28. Write extension evaluation reports and share results and impacts

d. Communication and informational technologies

29. Make effective presentations
30. Communicate effectively with community leaders
31. Organize extension campaigns
32. Write for news papers and mass media
33. Make good use of ICTs and / access and use web-based resources.

It should be noted that some competencies can be used for multiple functions. For instance specific competencies like PRA methods / FGD can be used in both planning and evaluation stages.

CHAPTER 3 - METHODOLOGY

3.1 STUDY LOCALE AND SAMPLING

The study was undertaken in three South Indian states, namely: Andhra Pradesh, Karnataka and Telangana by survey method in 2015-16. 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 every district, 30 VASs, who are the middle level livestock extension professionals were randomly selected to obtain a total of 270 respondents from three states.

3.2 OPERATIONALIZATION AND MEASUREMENT OF VARIABLES

Core competencies in the present study were operationalized as the basic sets of knowledge, skills, attitudes, and behaviors in process and technical areas that Livestock Extension Professionals required to perform their tasks well. Combination of these core competencies enables them to be more effective in addressing livestock farmers' needs.

Keeping in view of the current roles and responsibilities, the following 10 broad competencies required by Livestock Extension Professionals were identified and included in survey instrument (Appendix).

1. Specific livestock extension competencies.
2. Specific subject matter competencies.
3. Technical subject matter application competencies.
4. Livestock extension program development competencies.
5. Livestock extension program implementation competencies.
6. Livestock extension program evaluation competencies.
7. Communication competencies.
8. Education and informational technology competencies.
9. Personal and professional development competencies.
10. Diversity competencies.

3.2.1. Specific Livestock Extension Competencies: These were operationalized as 21 specific competencies viz., extension teaching / training methods, audio-visual aids, data collection tools, monitoring and evaluation competencies that the livestock extension professionals should be familiar with to perform their tasks well. The questionnaire comprising 21 items was administered to assess these competencies.

3.2.2. Specific Subject Matter Technical Competencies: The subject matter technical competencies were operationalized under four areas covered by Bachelors in Veterinary Science and Animal Husbandry (BVSc &AH) curriculum viz., basic bio-veterinary competencies (Anatomy, Physiology and Biochemistry), production competencies (Animal Nutrition, Animal Genetics, Livestock Production and Management (LPM), Livestock Products Technology (LPT), Poultry and Dairy), para-clinical competencies (Microbiology, Pharmacology, Parasitology and Pathology), and clinical competencies (Surgery, Medicine and Gynecology) that the Livestock Extension Professionals should be familiar with to perform extension tasks well. The questionnaire comprising these items was administered to assess these competencies.

3.2.3. Technical Subject Matter Application Competencies: Technical subject matter expertise was operationalized as ability of extension professionals to demonstrate the application of basic veterinary science and animal husbandry discipline knowledge in extension work, understand the new technology and associated risks, and refer to and make use of technical publications. The questionnaire comprising five items was administered to assess this competency.

3.2.4. Livestock Extension Program Development Competencies: Extension program development was operationalized as direction and intensity of livestock extension education efforts to bring about desirable change among community keeping in view of the national livestock development strategies, programs, and policies. The questionnaire comprising six items was administered to assess this competency.

3.2.5. Livestock Extension Program Implementation Competencies: Extension program implementation was operationalized as ability of extension professional to coordinate extension programs, demonstrate teamwork and negotiate skills, engage diverse local stakeholders, delegate responsibilities and follow participatory decision making in extension work. The questionnaire comprising seven items was administered to assess this competency.

3.2.6. Livestock Extension Program Evaluation Competencies: Program evaluation was operationalized as ability of extension professionals to understand monitoring and evaluation concepts, conduct monitoring and evaluation of extension programs, develop data collection instruments, apply qualitative and quantitative tools to collect evaluation data, analyze data, write evaluation report and share with stakeholders. The questionnaire comprising eight items was administered to assess this competency.

3.2.7. Communication Competencies: Communication competency was operationalized as ability of extension professionals to respect local culture, prepare reports of their works, share success stories and lessons-learned, use various communication channels to disseminate information about important extension activities and programs, possess good listening and public speaking skills. The questionnaire comprising six items was administered to assess this competency.

3.2.8. Education and Informational Technology Competencies: Education and information technology was operationalized as ability of extension professionals to use computers, audio-visual aids, mass media, mobile phones and social media for communication, teaching and learning. The questionnaire comprising eight items was administered to assess this competency.

3.2.9. Personal and Professional Development Competencies: Personal and professional development was operationalized as ability of extension professionals to practice principles of good governance, show commitment to career advancement, apply professional ethics in work, follow organizational policies and directives and demonstrate positive attitude towards extension work. The questionnaire comprising five items was administered to assess this competency.

3.2.10. Diversity Competencies: Diversity was operationalized as ability of extension professionals to understand diversity within and among stakeholders, identify their needs, develop extension programs to benefit and engage various social and marginalized groups and do teamwork with diverse staffs at different levels. The questionnaire comprising five items was administered to assess this competency.

Keeping in view of respondent's experience in livestock extension work, they were asked to rate the above 10 competencies on (Appendix):

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

To see difference between two means, independent sample t-test was applied.

3.2.11. Appropriate Ways to Acquire Core Competencies: This was operationalized as perception of extension professionals on the ways to acquire the competencies through pre-service, in-service, basic induction training and by participating in seminars and workshops. The respondents were asked to rate them on a four point Likert scale viz., not appropriate, somewhat appropriate, appropriate, and very appropriate with scores of 1,2,3 and 4, respectively. The responses were tabulated using frequencies and percentages.

3.2.12. Additional Competencies that Livestock Extension Professionals Need: The respondents were asked through open ended questions to name additional competencies, if any that livestock extension professional needed, but are not covered in the study.

3.2.13. Recommend Activities / Programs to Enhance Core Competencies: The respondents were asked through open ended questions to recommend three activities or programs to enhance core competencies among livestock extension professionals.

3.3 DATA COLLECTION AND ANALYSIS

The questionnaire covering all the variables was developed and pre-tested during 6-7 October 2015 with 28 participants of National Workshop on 'Capacity Needs Assessment of EAS Providers' Hyderabad, India. Based on pre-testing experience, the questionnaire was modified and duplicated for data collection (Appendx). Project contact persons were identified in all the nine districts to assist in data collection. Data were collected from the livestock extension professionals during their monthly meetings in district head quarters by the project contact persons. The data obtained was coded, entered into a computer spreadsheet and analyzed using the Statistical Package for Social Sciences, version 17.0 (SPSS, 2008).

3.4 LIMITATIONS OF THE STUDY

Considerable care and thought were exercised in making the study as objective and systematic as possible. Though every care was taken to collect and interpret the relevant information, there could be some distortion in the interpretation of the responses. The opinions of the respondents may not be free from individual biases and prejudices. It may be recognized that the findings of the study should not be generalized beyond the limits of the districts/states where the study was conducted. In other words, adequate care must be taken in extrapolating the findings of the study to other areas. The generalizations of results should be applied in the broad context only where similar situations prevail.

CHAPTER 4 - RESULTS AND DISCUSSION

The findings of the study are presented and discussed in this chapter.

4.1. Specific Livestock Extension Competencies

The mean scores on 'How Important the Competency' for all 21 specific extension competencies were higher than their corresponding mean scores on 'Current Level of Knowledge and /or Skills to Perform that Competency'. The 't' values revealed significant ($p < 0.000$) difference between all of them. Also the mean score on importance of overall livestock extension competencies (83.24) was higher than current level of knowledge and /or skills to perform those tasks (70.00) with a significant ($p < 0.000$) t value (Table 1).

Results (Table 1) reveal that livestock extension professionals' current level of knowledge and/or skills in specific extension competencies is low compared to their importance in their regular work. All these competencies have been included in extension courses of BVSc & AH curriculum (VCI,2008; VCI,2015). However in majority of the veterinary colleges the theoretical concepts of extension are taught well, but hands-on training with focus on practical application of these competencies is neglected due to reasons like inadequate extension faculty, inadequate transport facilities and inadequate funds for field training. Added to this the AHDs' main emphasis has been on production, diagnostic and curative animal health rather than preventive and extension education (Chander, 2013; Rao and Natchimuthu, 2015). As the focus has been mainly on production and clinical services, field veterinarians are unable to find time for extension services.

Table 1. Specific livestock extension competencies.

Specific livestock extension competencies	How important is this competency?*		Current level of knowledge and/or skills to perform the tasks**		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Result demonstration	4.06	0.71	3.41	0.63	11.11	.000
Method demonstration	4.11	0.78	3.41	0.67	11.21	.000
Campaign	3.94	0.76	3.31	0.69	10.02	.000
General meeting	3.82	0.69	3.38	0.70	7.37	.000
Group discussion	3.87	0.83	3.44	0.67	6.61	.000
Focus group discussion	3.64	1.07	3.21	0.87	5.21	.000
Exhibition	4.08	0.83	3.60	0.73	7.14	.000
Tours	3.87	0.88	3.49	0.87	5.07	.000
Field trips	3.99	0.89	3.50	0.87	6.42	.000
Preparation of interview schedule / questionnaires	3.57	1.01	3.26	0.83	3.92	.000
Survey	3.70	0.87	3.27	0.85	5.80	.000
Livestock shows	4.40	0.74	3.90	0.82	7.44	.000
Livestock camps	4.45	0.62	3.97	0.78	7.91	.000
Training needs assessment	3.96	0.83	3.12	0.78	12.03	.000
Organizing training	3.96	0.81	3.20	0.82	10.92	.000
Training methods	3.89	0.89	3.20	0.88	8.95	.000
Audio-visual aids	4.23	0.78	3.36	0.81	12.76	.000
Extension literature	4.01	0.85	3.36	0.80	9.22	.000
Participatory methods	3.83	0.87	3.01	0.84	11.07	.000
Monitoring	3.86	0.84	2.89	0.94	12.67	.000
Evaluation	4.01	0.85	2.74	0.91	16.73	.000
<i>Overall livestock extension competencies</i>	83.24	11.25	70.00	10.22	14.31	.000

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

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

The specific livestock extension competencies assessed above can be grouped into:

- a. Individual, group and mass contact extension teaching methods
- b. Audio-visual aids
- c. Data collection tools
- d. Needs assessment
- e. Training methods
- f. Participatory extension tools
- g. Monitoring and evaluation competencies.

A proper understanding and inter-linkages of above competencies is necessary for an effective livestock extension work. In general, mass contact competencies are applied at the attention and interest stages to create awareness about an innovation in livestock development. Group contact competencies work out better in interest, desire and conviction stages of adoption of innovations. Individual contact competencies are useful in action and satisfaction stages. However, one competency supplements and complements other competencies, and, skilful combination of various competencies as a package will provide good results (Box 3).

Box 3: Package of Extension Competencies to Control New Castle Disease (ND) in Village Chickens

- 112 page ND field manual
- ND training manual
- ND laboratory manual
- Flip chart
- Poster
- Pamphlet
- ND vaccination calendar
- ND vaccination song
- Audio—cassette with radio programs
- Play

Source: Alexander et al.,(2004).

Relative costs, extension worker’s familiarity with competencies, needs of livestock farmers, objectives and length of the livestock extension program, availability of physical facilities, and weather conditions are some of the other factors to be considered while applying extension competencies (Box 4).

Acquiring competencies in different training methods by field extension functionaries is essential in order to improve the skills and to train the livestock keepers. Livestock extension professionals should possess competencies in training needs identification using participatory methods, training plan development, design of training program and manual, training program implementation using different methods of training, monitoring and evaluation.

Box 4: Selection of Livestock Extension Methods

<p><i>Education level of the livestock farmers</i></p> <ul style="list-style-type: none"> • For illiterates -- <i>Personal visits.</i> • For literate -- <i>Written materials.</i> <p><i>Size of the livestock farmers</i></p> <ul style="list-style-type: none"> • For less than 30 -- <i>Lecture, Group discussion.</i> • For more than 30-- <i>Mass methods.</i> 	<p><i>Livestock extension program’s credibility</i></p> <ul style="list-style-type: none"> • New program, yet to gain confidence of farmers -- <i>Result demonstration.</i> • Well established program with proven success -- <i>Circular letter.</i> <p><i>Size of livestock extension staff</i></p> <ul style="list-style-type: none"> • Few -- <i>Group and mass contact methods.</i> • Large -- <i>Individual contact methods.</i>
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<p><i>Livestock extension program objective(s)</i></p> <ul style="list-style-type: none"> • To bring awareness -- <i>Mass methods.</i> • To change attitude -- <i>Group discussion.</i> • To impart skill -- <i>Demonstration.</i> <p><i>Livestock extension program subject matter</i></p> <ul style="list-style-type: none"> • To prove value of a recommended practice -- <i>Result demonstration.</i> • To teach a new skill, or an old one in an improved way -- <i>Method demonstration.</i> • To disseminate simple practice — <i>News article.</i> • To teach a complex technology — <i>Face-to-face contact with audio-visual aids.</i> 	<p><i>Availability of media</i></p> <ul style="list-style-type: none"> • Creating awareness and reinforcement of ideas — <i>Television, radio, newspaper. Time of dissemination</i> • Emergency for an individual livestock farmer — <i>Mobile phone call.</i> • Emergency for a group or a large number of livestock farmers — <i>Radio, television, public address system.</i> <p style="text-align: right;"><i>Source: Sasidhar et al., (2014).</i></p>
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Participatory monitoring and evaluation competencies helps in involving all stakeholders in extension program planning, implementation and evaluation, promotes the development of a learning partnership comprising male and female livestock farmers, community representatives, traders and government officials (Bagnol, 2014). Participatory competencies such as participatory rural appraisal (PRA), participatory epidemiology (Catley, 2005) and participatory impact assessment (Catley *et al.*, 2013) come from a long tradition of participatory practices initiated at the end of the 1980s for implementation in development activities. The PRA, participatory learning methods (PLM), participatory assessment monitoring and evaluation (PAME), and participatory learning and action (PLA) are some of their fields of application which complements other competencies of livestock extension workers.

Apart from theoretical concepts, hands-on training with practical application of these competencies during pre-service training of graduates helps in achieving required skills as ‘day-one competencies’.

4.2 Specific Subject Matter Competencies

Among the subject matter competencies, the mean scores on ‘How Important the Competency’ for production (4.29), para-clinical (3.63) and clinical (4.28) subject matter related competencies were significantly higher than their corresponding mean scores (3.67, 3.41 and 3.74) on ‘Current Level of Knowledge and /or Skills to Perform those activities. Also the mean score on importance of overall subject matter related competencies (15.51) was significantly higher than current level of knowledge and /or skills to perform (14.09) (Table 2). However, the mean scores on basic bio veterinary competencies revealed a non-significant difference.

Table 2. Specific subject matter related competencies

Specific subject matter competencies	How important is this competency?*		Current level of knowledge and/or skills to perform the tasks**		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Basic bio veterinary competencies (Anatomy, Physiology and Biochemistry)	3.31	1.27	3.27	0.73	0.46	.647
Production competencies (Animal Nutrition, LPM, LPT, Poultry and Dairy)	4.29	0.76	3.67	0.72	9.70	.000

Specific livestock extension competencies	How important is this competency?*		Current level of knowledge and/or skills to perform the tasks**		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Para-clinical competencies (Microbiology, Pharmacology, Parasitological, Pathology)	3.63	1.05	3.41	0.71	2.87	.004
Clinical competencies (Surgery, Medicine, Gynecology)	4.28	0.89	3.74	0.76	7.61	.000
<i>Overall subject matter related competencies</i>	15.51	3.07	14.09	2.24	6.15	.000

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

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

The results on specific subject matter related competencies revealed that livestock extension professionals need more in-service training on improving production competencies (Animal Nutrition, LPM, LPT, Poultry and Dairy), para-clinical competencies (Microbiology, Pharmacology, Parasitological, Pathology) and clinical competencies (Surgery, Medicine, Gynecology).

Essential technical subject matter competencies required of veterinarians prescribed by Royal College of Veterinary Surgeons under three main areas, and these are reflected in both the “day one” and the “year one” requirements. They are (RCVS, 2006):

- 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.

These competencies are to be achieved in pre-service training as part of curriculum.

Though the main emphasis of AHD has been on production, diagnostic and curative animal health services, the results revealed a significant gap between ‘how important these competencies’ and the ‘current level of knowledge and/or skills to perform the tasks.’. This suggests the need for more in-service trainings to field extension functionaries on production, para-clinical and clinical competencies in order to supplement and complement livestock extension services.

4.3 Technical Subject Matter Application Competencies.

The mean scores on ‘How Important the Competency’ for all five technical subject matter application competencies were higher than their corresponding mean scores on ‘Current Level of Knowledge and /or Skills to Perform the tasks’ with a significant difference between all of them. Also the mean score on importance of overall technical subject matter application competencies (19.86) was higher than current level of knowledge and /or skills to perform (17.30) with a significant ($p < 0.000$) t value (Table 3).

Table 3. 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	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Demonstrate basic knowledge in discipline.	3.60	1.09	3.36	0.64	3.08	.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	.000
Be able to educate community members about different types of risks and uncertainties (due to climate change, market fluctuations, disasters).	4.20	0.75	3.54	0.72	10.29	.000
Refer to and make use of publications—journals, research reports, etc.	4.07	0.82	3.56	0.70	7.76	.000
Demonstrate basic knowledge of livestock businesses, and help entrepreneurship development among extension clientele.	3.94	0.92	3.32	0.75	8.47	.000
<i>Overall technical subject matter application expertise</i>	19.86	3.08	17.30	2.50	10.62	.000

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

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

The results (Table 3) revealed that livestock extension professionals need more refresher trainings on application of specific subject matter competencies in extension work. The technical subject matter application capacity building areas for field veterinarians identified by Rao et al., (2015) includes utilization of livestock by-products, value chain development, regulations on food safety, SPS standards and certification, entrepreneurship and market intelligence, diagnostic kits and laboratory techniques, specialty in clinical subjects, reducing livestock-associated greenhouse gas emissions and fodder crisis management.

4.4. Livestock Extension Program Development Competencies

The mean scores on ‘How Important the Competency’ for all six livestock extension program development competencies were higher than their corresponding mean scores on ‘Current Level of Knowledge and /or Skills to Perform the tasks’ and the differences were found highly significant . Also the mean score on importance of overall extension program development competencies (22.73) was significantly higher than current level of knowledge and /or skills to perform (19.66).

Table 4. Livestock extension program development competencies.

Livestock extension program development competencies	How important is this competency?*		Current level of knowledge and/or skills to perform the tasks**		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Familiar with the vision, mission and goals of extension service.	3.71	0.93	3.33	0.73	5.334	.000
Knowledgeable about national livestock development strategies, programs, and policies.	3.68	0.92	3.19	0.83	6.595	.000
Able to engage stakeholders to conduct needs assessment and prioritize needs.	3.75	0.82	3.21	0.74	7.992	.000
Able to allocate resources to address priority needs.	4.04	0.78	3.31	0.78	10.912	.000
Able to engage local development partners such as NGOs, SHGs, and cooperatives in extension program.	3.85	0.81	3.30	0.78	7.998	.000
Familiar with government administrative and financial rules and regulations.	3.69	1.02	3.32	0.82	4.662	.000
<i>Overall livestock extension program development competencies</i>	22.73	3.95	19.66	3.62	9.411	.000

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

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

4.5 Livestock Extension Program Implementation Competencies

The mean scores on ‘How Important the Competency’ for all seven livestock extension program implementation competencies were higher than their corresponding mean scores on ‘Current Level of Knowledge and /or Skills to Perform the tasks’ with a significant ($p < 0.000$) difference between all of them. The mean score on importance of overall extension program implementation competencies (27.87) was also significantly higher than current level of knowledge and /or skills to perform (23.79) (Table 5).

Table 5. Livestock extension program implementation competencies

Livestock extension program implementation competencies	How important is this competency?*		Current level of knowledge and/or skills to perform the tasks**		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Coordinate extension programs and activities within your jurisdiction.	3.82	0.81	3.32	0.65	8.00	.000
Demonstrate teamwork skills to achieve extension results.	4.06	0.74	3.44	0.74	9.76	.000

Livestock extension program implementation competencies	How important is this competency?*		Current level of knowledge and/or skills to perform the tasks**		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Engage local stakeholders in implementing extension program activities.	4.03	0.74	3.39	0.73	10.20	.000
Demonstrate negotiation skills to reach consensus and resolve conflicts.	4.16	0.75	3.54	0.72	9.66	.000
Follow participatory decision making model in extension work.	3.83	0.78	3.33	0.70	7.81	.000
Delegate responsibilities to staff as needed.	3.97	0.78	3.38	0.68	9.32	.000
Be able to engage women farmers and members of minority groups in extension work.	4.00	0.86	3.40	0.73	8.78	.000
<i>Overall program implementation competencies.</i>	<i>27.87</i>	<i>3.93</i>	<i>23.79</i>	<i>3.74</i>	<i>12.35</i>	<i>.000</i>

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

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

4.6 Livestock Extension Program Evaluation Competencies

The mean scores on 'How Important the Competency' for all seven extension program evaluation competencies were higher than their corresponding mean scores on 'Current Level of Knowledge and /or Skills to Perform the tasks' with a significant difference between all of them. Similarly, the mean score on importance of overall extension program evaluation competencies (25.97) was significantly higher than current level of knowledge and /or skills to perform (22.42). (Table 6).

Table 6. Livestock extension program evaluation competencies

Livestock extension program implementation competencies	How important is this competency?*		Current level of knowledge and/or skills to perform the tasks**		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Understand theories and principles of monitoring and evaluation.	3.36	0.90	3.14	0.69	3.21	.001
Conduct monitoring and evaluation of extension programs.	3.54	0.91	3.26	0.69	4.14	.000
Develop data collection instruments for monitoring and evaluation of extension works.	3.71	0.82	3.30	0.67	6.41	.000

Livestock extension program implementation competencies	How important is this competency?*		Current level of knowledge and/or skills to perform the tasks**		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Apply qualitative tools and techniques (e.g., focus group discussion, in-depth interview, etc.) to collect evaluation data.	3.74	0.87	3.17	0.87	7.71	.000
Apply quantitative tools and techniques (e.g., survey) to collect evaluation data.	3.86	0.84	3.19	0.87	9.22	.000
Analyze data (qualitative and quantitative), interpret data, and write evaluation report.	3.88	0.89	3.18	0.85	9.42	.000
Share evaluation reports within their organizations and with stakeholders.	3.86	0.86	3.20	0.78	9.32	.000
<i>Overall program evaluation competencies</i>	25.97	4.61	22.42	4.48	9.05	.000

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

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

The results presented in Table 4, 5 and 6 revealed that livestock extension professionals need to acquire more competencies in extension program planning, implementation and evaluation. A livestock extension worker must be able to plan a program meticulously by expanding participation not just in terms of numbers but also with active involvement of different stakeholders within a village. While planning a program, an extension worker should know the stakeholders and beneficiaries of the program, availability of the resources, current national livestock development strategies and also the emphasis of the government. Doing needs assessment with the active participation of different groups of people, especially the poor and women farmers can fine-tune a program to meet local needs.

Effective livestock extension professionals are able to implement extension programs by coordinating activities and collaborating with development partners within their assigned area or communities by building teamwork, involving local stakeholders and negotiating when conflicts arise. Reaching and involving members of marginalized groups — such as women and members of minority groups — through participatory methods is another important competency that livestock extension workers should acquire. Touch and feel never fail, so it is effective to allow local farmers to try their hands in the field so they feel confident to adopt new technologies, use equipment, employ inputs, etc. when the extension worker is not around.

A livestock extension worker has to be aware of the programs launched in his/her areas and evaluate their success to avoid repeating mistakes and learn what did work. Resources are limited, and there is always competition for resources. The government and funders tend to give priority to those programs that can show that they have succeeded in reaching and benefitting previously unreached groups.

4.7. Communication Competencies

The mean scores on the importance of all the six communication competencies were significantly higher than their corresponding mean scores on the existing Level of Knowledge and /or Skills to perform the tasks. Same is the case with overall communication skills / competencies. (Table 7).

The results (Table 7) revealed that livestock extension professionals need to acquire more communication competencies to perform their tasks effectively. Extension workers have to be good communicators so that they are able to persuade farmers to change their methods of livestock management or adopt innovative practices or technologies. It is no simple task to bring about the positive behavioral change. They should effectively listen to what their audience says and be able to use language and content which the members of the target groups can understand. They need to learn and practice well so all doubts are taken care of before they reach the audience. The next stage of good communication is public relations. Extension professionals need to be able to build good relationships and rapport with farmers so as to enable the later to develop trust and confidence of the extension professionals. When once the extension professional wins the trust, the farmers will be very free to talk to him and seek his guidance in addressing various farm related issues. The stronger the relationship and feelings of trust, the quicker the adoption of the recommended technology and practices (Suvedi and Kaplowitz, 2016).

Table 7. Communication competencies

Communication skills / competencies	How important is this competency?*		Current level of knowledge and/or skills to perform the tasks**		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Respect local culture while communicating with clients.	4.09	0.86	3.53	0.73	8.13	.000
Prepare monthly, quarterly, and annual progress reports of their work	3.54	0.98	3.25	0.80	3.80	.000
Share success stories and lessons-learned with stakeholders through various media.	3.88	0.84	3.41	0.71	7.06	.000
Use various communication channels to disseminate information about important extension activities and programs.	4.09	0.61	3.38	0.70	12.53	.000
Possess good listening skills and listen to all clients and stakeholders.	4.34	0.73	3.69	0.78	9.98	.000
Demonstrate good public speaking skills.	4.27	0.75	3.38	0.81	13.40	.000
<i>Overall communication skills / competencies</i>	24.22	3.39	20.64	3.29	12.45	.000

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

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

The extension courses in BVSc&AH gave adequate emphasis on communication core competencies (VCI, 2008; VCI, 2015). Course content in communication will enable the veterinary students to become proficient in composition/writing, public speaking, critical reading and critical thinking in their common language. The OIE core curriculum (OIE, 2012) stressed that, oral and written communication skills are essential to the delivery of veterinary services, and should be practiced, assessed and improved upon throughout the veterinary school curriculum. A separate series of classes focusing only on writing or speech skills need not be included in the curriculum. Instead, the appropriate communication skills should be taught in relevant classes (e.g., veterinary medical record writing and client communication in clinical and diagnostic courses).

4.8. Education and Informational Technology Competencies

The mean scores on 'How Important the Competency' for three out of eight education and informational technologies namely audio-visual aids, mass media and mobile phone services were higher than their corresponding mean scores on 'Current Level of Knowledge and /or Skills to Perform' and these differences were found statistically significant. However, the mean scores on importance of remaining five competencies viz., Microsoft Excel, Word, PowerPoint, Computers and Social Media use in communication were found significantly lower than their corresponding mean scores on 'Current Level of Knowledge and /or Skills to Perform'. The mean score on importance of overall education and informational technologies competencies (26.59) was significantly lower than the current level of knowledge and /or skills to perform (28.83) (Table 8).

Table 8. Education and informational technology competencies

Education and informational technology competencies	How important is this competency?*		Current level of knowledge and/or skills to perform the tasks**		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Microsoft Excel for data entry and data analysis.	2.67	0.87	3.43	0.80	-10.53	.000
Microsoft Word for word processing (e.g., typing, editing, printing) and designing graphics.	3.15	0.95	3.86	0.91	-8.87	.000
Microsoft PowerPoint for making presentations.	2.78	1.02	3.47	0.90	-8.35	.000
Audio-visual aids such as charts, graphs, and puppet shows for teaching and learning.	4.19	0.79	3.57	0.87	8.67	.000
Mass media like FM radio stations and television channels for communication.	3.99	0.81	3.35	0.83	9.04	.000
Computers (email, Internet, and web pages) for communication.	2.90	0.92	3.62	0.89	-9.29	.000
Mobile phone services (e.g., phone calls, texting, SMS service) for communication.	4.23	0.88	3.92	0.74	4.51	.000
Social media like Face book, WhatsApp etc.	2.68	1.12	3.61	1.07	-9.86	.000
<i>Overall education and informational technology competencies</i>	26.59	3.91	28.83	4.88	-5.90	.000

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

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

The results (Table 8) revealed that livestock extension professionals have more knowledge and/or skills in education and ICTs competencies than their current level of use / scope in their day to day work. The ICT competencies of extension professionals are very high in the areas like Microsoft Excel for data entry and data

analysis, Microsoft Word for word processing (e.g., typing, editing, printing) and designing graphics, Microsoft PowerPoint for making presentations, use of computers for email, Internet, and web based communication, Mobile phone services (e.g., phone calls, texting, SMS service) for communication and Social media like Facebook, WhatsApp etc. This shows the inadequate use of ICTs by the extension professionals for the livestock development.

ICTs such as mobile phones, texting, conference calls, computer, Internet, email, social media etc., are increasingly being used in extension services. The ICTs were found to be effective in reaching a large number of users in a short time. ICTs are becoming credible, relevant, reliable, timely and cost-effective sources of information (Anderson and Feder, 2007; Aker, 2011; MEAS, 2011; USAID, 2012). As ICTs are emerging as powerful communication tools, extension professionals should be able to exploit them for extension work and AHDs need to facilitate and encourage their use in extension work.

For example, among various ICT tools, mobile phone has emerged as one of the widely accepted and adopted instruments to ease the information communication process among farming communities, lowering transaction costs and raising the income levels of farmers (Hayrol et al., 2009; Mittal et al., 2010; Mittal and Tripathi, 2009; Inigo et al., 2014; Rathod et al., 2016). Tamizhkumaran and Natchimuthu (2014) reported that almost all the livestock owners own mobile phones and they were using them to receive the advisory services from the veterinarians. Similarly, the field veterinarians were using mobile phones in delivery of livestock services. However, full potential of mobile phones in extension communication is yet to be realized due to lack of customization of mobile services to serve specific needs of farmers and lack of operational knowledge among stakeholders (Gakuru et al., 2009, Babu and Ashokan 2011, Inigo et al., 2014; Rathod and Chander, 2014).

CRISP (2015) suggested that, the ICT competencies of extension workers can be further enhanced through: developing databases, expert systems and online package of practices; providing exposure from successful cases of effective application of ICTs.; providing tablets, smart phones and other accessories to extension professionals and providing resources to use these (data card, data plans) and impart training; providing training to enhance written (eg; writing for social media, designing text messages) and oral communication skills (delivering radio talks, development of videos, use of pictures/images, designing voice messages etc).

4.9. Personal and Professional Development Competencies

The mean scores on 'How Important the Competency' for all five personal and professional development competencies were higher than their corresponding mean scores on 'Current Level of Knowledge and /or Skills to Perform the tasks with a significant difference between all of them. The mean score on importance of overall personal and professional development competencies (20.10) was also found significantly higher than current level of knowledge and /or skills to perform (17.84). (Table 9).

Table 9. Personal and professional development competencies

Personal and professional development competencies	How important is this competency?*		Current level of knowledge and/or skills to perform the tasks**		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Practice principles of good governance (i.e., participation of clients, accountability to clients, transparency).	3.70	0.96	3.37	0.61	4.86	.000
Show commitment to career advancement (participate in lifelong-learning, in service training programs, professional meeting and conferences).	3.61	1.11	3.40	0.75	2.58	.010

Personal and professional development competencies	How important is this competency?*		Current level of knowledge and/or skills to perform the tasks**		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Apply professional ethics in works, i.e. promote research based recommendation or technology, honesty and integrity.	4.42	0.75	3.79	0.74	9.79	.000
Follow organizational policies and directives for in-service training and professional development.	3.96	0.83	3.48	0.76	7.04	.000
Demonstrate positive attitude towards extension work.	4.42	0.75	3.80	0.76	9.49	.000
<i>Overall personal and professional development competencies</i>	20.10	3.29	17.84	2.79	8.69	.000

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

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

The results (Table 9) revealed that AHDs need to provide more personal and professional development opportunities through organizing refresher training programs to enable extension professionals to acquire these important core competencies. The extension professionals must keep themselves abreast with the relevant veterinary and animal husbandry research happenings in various parts of the country, or even around the world, to be able to address the farmers' emerging needs. Spending time on reading up on recent research can help them choose technologies and practices that are well-suited to the local environment and people and sustainable over the long term.

Understanding the core values of extension is essential for all professionals. The field workers must maintain ethical standards of the profession, value the principles of honesty, respect for the local culture, accountability, inclusion, transparency and integrity (Davis, 2015). However, to field extension functionaries, the AHDs are not providing adequate career advancement opportunities like promotions to next level, participate in lifelong-learning, in service training programs, professional meeting and conferences.

4.10 Diversity Competencies

The mean scores as well as overall diversity competency scores on 'How Important the Competency' for all five diversity competencies were significantly higher than their corresponding mean scores on 'Current Level of Knowledge and /or Skills to Perform those Competencies'. (Table 10).

Table 10. Diversity competencies

Diversity competencies	How important is this competency?*		Current level of knowledge and/or skills to perform the tasks**		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Understand that diversity exists within and among clients and stakeholders.	3.93	0.79	3.47	0.66	7.25	.000

Personal and professional development competencies	How important is this competency?*		Current level of knowledge and/or skills to perform the tasks**		t value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Identify the needs of women, small farmers and minority groups.	3.94	0.82	3.41	0.69	8.13	.000
Develop extension programs to benefit women farmers.	4.05	0.81	3.47	0.72	8.79	.000
Engage various social and marginalized groups in extension programs.	4.00	0.82	3.41	0.69	8.98	.000
Do teamwork with diverse staffs at district and sub-district levels.	4.19	0.72	3.60	0.72	9.57	.000
<i>Overall diversity competencies</i>	20.11	3.12	17.36	2.83	10.71	.000

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

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

Farmers have a better understanding about their farming system, and livestock extension professional need to accept and respect it. Livestock extension professionals are in the field to serve farmers' interests and further their aspirations, so they need to find out what farmers know, their diverse interests and build on that. If livestock extension professional seems to be a "know-it-all," there is little chance that a farmer will express herself/himself. Further, a village has multiple identity groups in terms of wealth, ethnicity, religion, caste, language, tribe, etc. and each group has its own means and goals. A livestock extension professional has to be sensitive toward these to ensure that a program appeals to a wide audience containing many identities and does not conflict with any religious/cultural belief or tradition. According to Suvedi and Kaplowitz (2016), to be effective, extension workers should be able to:

- Engage people from various socioeconomic groups in extension program development.
- Demonstrate sensitivity to the unique and diverse needs of cultural groups in the community.
- Enhance participation of cultural groups in extension programs and services.
- Effectively organize and offer programs that reflect laws and policies that support diversity.

4.11 Appropriate Ways to Acquire the Core Competencies

The results on appropriate ways to acquire the core competencies — in terms of "not appropriate", "somewhat appropriate", "appropriate" and "very appropriate" — is presented in Table 11. The results showed that more than 50 per cent of the respondents considered all the four methods viz pre-service training, in-service training, basic induction training and seminars both at national and international level were appropriate to acquire the core competencies. Similarly, considerable percentage of respondents also perceived all these methods as more appropriate indicating thereby that these methods could be employed to enhance their core competencies.

Table 11. Appropriate ways to acquire the core competencies

Appropriate ways to acquire core competencies	Not appropriate	Somewhat appropriate	Appropriate	Very appropriate
	F (%)	F (%)	F (%)	F (%)
Through pre-service training (e.g., undergraduate/graduate education in veterinary colleges)	10 (3.7)	7 (2.6)	147 (54.4)	106 (39.3)
Through 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)
Through basic induction training	2 (0.7)	49 (18.1)	152(56.3)	67(24.8)
Through national and international seminars, workshops, webinars, etc.	37(13.7)	48 (17.8)	126 (46.7)	59 (21.9)

The World Organization for Animal Health Guidelines on Veterinary Education Core Curriculum (OIE, 2012) recommended acquiring core competencies through pre-service training. Also the course curriculum of BVSc &AH covers most of the core competencies assessed in this study through pre-service training (VCI, 2008; VCI, 2015). The minimum competencies have to be defined, so that these outcomes can be used in designing 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 these skills are delivered through the pre-service training (Davis et al., 2007).

Refresher or in-service training is the main and in most cases the only form of capacity development in India. Though the country has several agencies involved in in-service training of extension personnel, most of their focus has been on crop extension. Training infrastructure for livestock extension is considerably weak (Prasad et al., 2015). The Planning Commission of India (2012b) also emphasized that re-training of the field veterinarians to brace for the recent developments is paramount and they should attend mandatory refresher courses every 5 years during their career. Although, the AHDs have regional training centers in each state to impart induction and in-service training to field veterinarians, their focus is on improving technical competencies, but not extension competencies.

4.12 Additional Competencies that Livestock Extension Professional Need

The respondents suggested some additional competencies that livestock extension professionals need to perform their day to day activities but not covered in the study. They are summarized in Box 5.

Box 5. Additional Competencies that Livestock Extension Professionals Need

- Time management skills
- Stress management
- Motivational techniques
- Digital communication technologies
- Writing and orator skills
- Priority setting methods
- Performance appraisal methods
- SWOT analysis
- Team work and group dynamics

- Value chain and market analysis
- Policy facilitation
- Economics and business management
- Legislations on veterinary and animal husbandry

4.13. Recommended Activities / Programs to Enhance Core Competencies

The respondents suggested activities / programs to enhance core competencies, which are summarized in Box.6

Box. 6. Recommended Activities / Programs to Enhance Core Competencies

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

CHAPTER 5 – CONCLUSIONS AND IMPLICATIONS FOR POLICY

The study assessed core competencies of livestock extension professionals in India's three states viz. Andhra Pradesh, Karnataka and Telangana and addressed the following research questions:

- Do livestock extension professionals possess core (process and technical) competencies in order to provide integrated support services to the farmers?
- Are the livestock extension professionals aware how important these core competencies are and at what level do they have the knowledge and or skills to perform the required competencies?
- What are the activities or programs required and what are the appropriate ways to enhance core competencies among livestock extension professionals?

The findings reveal that livestock extension professionals' current level of knowledge and/or skills are inadequate in specific extension competencies viz., extension teaching / training methods, a-v aids, data collection tools, needs assessment, participatory tools, monitoring and evaluation competencies. They need more in-service training on improving production, para-clinical and clinical competencies and application of these specific technical competencies in extension work. The results also confirm that livestock extension professionals need to acquire more competencies in extension program planning, implementation, evaluation, communication, personal and professional development and diversity areas. However, the livestock extension professionals have more knowledge and/or skills in education and ICTs competencies than their current level of use / scope in their day to day work. Findings suggested 'pre-service, in-service and basic induction trainings, attending national and international seminars, workshops and webinars' as appropriate ways to acquire the core competencies. The additional competencies required as perceived by respondents includes time and stress management skills, motivational techniques, digital communication technologies, writing and orator skills, priority setting and performance appraisal methods, SWOT analysis, team work and group dynamics, value chain and market analysis, policy facilitation, economics and business management, and legislations on veterinary and animal husbandry.

Except the ICT related competencies, in all other nine broad areas of competencies the extension professionals' current level of knowledge and /or skills are significantly lower compared to their importance in day to day work. *This leads to the conclusion that livestock extension professionals core (process and technical) competencies are inadequate to provide three types of integrated support services to the farmers viz., (i) Livestock extension and advisory services (to enrich the knowledge and improve the skills of livestock farmers); (ii) To make available and access to input service such as semen, vaccines, medicines, equipments, instruments, feed etc. (to augment production and productivity) and (iii) Delivery of the technical services (clinical and para-clinical health care of livestock).*

To provide the integrated support efficiently, livestock extension professionals need to have or acquire a set of core competencies — both process and technical skills. *The rating of respondents and overall analysis of the results point to the conclusion that they are aware how important these core competencies are and what level of knowledge and or skills they currently possess to perform the required competencies.*

Majority of the respondents perceived that 'pre-service, in-service and basic induction trainings as well as participation in national and international seminars, workshops and webinars as appropriate ways to acquire the core competencies.

The overall findings revealed a significant gap between existing and required core competencies — both process and technical competencies. Keeping this in view, and to bridge the gap in competencies, the following specific policy interventions are recommended:

Improving Competencies through Pre-Service Training: There are significant advantages to incorporate accurately defined competency outcomes in BVSc&AH curriculum in veterinary colleges. Once the minimum competencies have been defined, these outcomes can be used to design veterinary curriculum for effective pre-service training. Providing students, faculty and the profession with explicit statements on the competencies

required, enables all stakeholders to work towards the common goal of ensuring these competencies are delivered through pre-service training (Davis et al., 2007). At global level, the World Organization for Animal Health Guidelines on Veterinary Education Core Curriculum (OIE, 2012) recommended acquiring core competencies through pre-service training. At National level, India's BVSc &AH curriculum includes most of the core competencies — both process and technical competencies — assessed in this study (VCI, 2008; VCI, 2015). However, the concern is effective pre-service training through hands-on instruction and proper assessment of competencies before certification.

Improving Competencies through Induction and In-Service Training: Basic induction and refresher / in-service trainings are the main and in most case the only forms of capacity development in India. Though the country has several agencies involved in training of extension personnel, most of their focus has been on crop extension and training infrastructure for livestock extension is considerably weak (Prasad et al., 2015). The Planning Commission of India (2012b) also emphasized that re-training of the field veterinarian to brace for the recent developments is paramount and they should attend mandatory refresher courses every 5 years during their career. To impart induction and in-service training in technical areas to field veterinarians, the AHDs have regional training centers in each state. In addition, veterinary colleges / ICAR animal science institutes are also imparting in-service technical trainings to a limited extent. To impart in-service training in extension or process competencies, the AHDs have no in-house facilities and are exclusively dependent on Extension Education Institutes (EEI), State Agricultural Management and Extension Training Institute (SAMITIS), National Institute of Agricultural Extension Management (MANAGE) etc at regional and National levels. However as mentioned earlier their focus has been primarily on crop extension. Therefore, there is a need to establish regional academic staff colleges exclusively to strengthen the skills and competence of field veterinarians of AHDs in extension or process competencies, which was also recommended by Rao et al., (2015). Further the existing training centers of AHDs need to be strengthened on livestock extension training facilities, infrastructure and faculties to impart need based process skills to field veterinarians at local level.

Competency Development through Continuing Veterinary Education: Adequate mechanisms for capacity building through CVE programs do not exist 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, i.e. (i) 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 (Rao, 2003; Natchimuthu et al., 2005; SAPPLPP, 2012) (ii) increasing demand for livestock products, adding value, trade in livestock products, SPS standards (Delgado et al., 1999; Rao et al., 2008; Rao et al., 2015), (iii) feed and fodder scarcity, crop-residue feeding and associated greenhouse gas emissions from livestock, increasing costs of inputs and labor, emerging diseases and lack of expertise in very specialized clinical subjects (Ahuja et al., 2000; Steinfeld et al., 2006; Rao et al., 2008; Chacko et al., 2010; Hegde, 2010; Rao et al., 2015), and (iv) the changing role of veterinarians and the information needs of livestock farmers (Matthewman and Ashley, 1996; Rao, 2003; Rao et al., 2008; Chander et al., 2010). To meet the evolving challenges confronting the livestock sector, field veterinarians need to acquire new competencies by attending CVE programs on topics identified in this study among others.

Improving the Institutional Mechanisms on Core Competencies: The recommended institutional mechanisms or programs to enhance core competencies among livestock extension professionals are: assessment of core competencies at regular intervals to identify capacity gaps and training needs, better infrastructure at regional training centers and veterinary hospitals with supporting staff, more frequent meetings, trainings, exposure visits, workshops and webinars, continuing veterinary education programs on technical subjects, delinking of extension work and technical services and developing an online manual on livestock extension competencies. In all these cases the emphasis must be on quality rather than on the number of programs or training centres. The training organizers must be effective in imparting the skills and developing positive attitudes among the extension professionals rather than on improving the knowledge alone.

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Assessment of Core Competencies of Livestock Extension Professionals in India
(Survey Instrument)

Dear Sir / Madam,

Greetings. We are conducting a survey on '**Assessment of Core Competencies of Livestock Extension Professionals in India**' in an USAID funded Modernizing Extension and Advisory Services project.

Core competencies are basic sets of knowledge, skills, attitudes, and behaviors that Livestock Extension Professionals required to perform their tasks well. Combination of these core competencies with technical knowledge and skills allow Livestock Extension Professionals to be more effective in addressing livestock farmers' needs.

In this survey, Veterinary Assistant Surgeons working for Animal Husbandry Departments (AHDs) are considered as Livestock Extension Professionals.

As a first step, we identified following broad competencies required by Livestock Extension Professionals in India in view of their current roles and responsibilities.

1. Specific livestock extension competencies	2. Specific subject matter competencies.
3. Technical subject matter application competencies.	4. Livestock extension program development competencies.
5. Livestock extension program implementation competencies.	6. Livestock extension program evaluation competencies.
7. Communication competencies.	8. Education and informational technology competencies.
9. Personal and professional development competencies.	10. Diversity competencies.

Keeping in view of your experience in Livestock Extension Work, you have been identified as a respondent for this study.

Please rate:

- A. The importance on each competency on 1 to 5 scales as: 1 = Not important; 2 = Somewhat important; 3 = Average; 4 = Important, and; 5 = Very important.
- B. Your current level of knowledge and/or skills to perform each competency on 1 to 5 scale as : 1= Very low; 2=Low; 3=Moderate; 4 = High, and; 5=Very high

We hope you will take a few minutes to complete this questionnaire. Thank you for taking the time and your opinion is greatly appreciated.

Yours sincerely,

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&

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1. Specific Livestock Extension Competencies

Livestock Extension Professionals should be familiar with :		How important is this task?					What is your level of knowledge and/or skills to perform this task				
		Not important	Some what important	Average	Important	Very important	Very low	Low	Moderate	High	Very high
1.	Result Demonstration										
2.	Method Demonstration										
3.	Campaign										
4.	General Meeting										
5.	Group Discussion										
6.	Focus Group Discussion										
7.	Exhibition										
8.	Tours										
9.	Field Trips										
10.	Preparation of Interview Schedule / Questionnaires										
11.	Survey										
12.	Livestock Shows										
13.	Livestock Camps										
14.	Training Needs Assessment										
15.	Organizing Training										
16.	Training Methods										
17.	Audio-visual aids										
18.	Extension Literature										
19.	Participatory Methods										
20.	Monitoring										
21.	Evaluation										
22.	Any other (Please specify)										

2. Specific Subject Matter Competencies

Livestock Extension Professionals should be familiar with :		How important is this task?					What is your level of knowledge and/or skills to perform this task				
		Not important	Some what important	Average	Important	Very important	Very low	Low	Moderate	High	Very high
1.	Basic Bio Veterinary Competencies (Anatomy, Physiology and Biochemistry)										
2.	Production Competencies (Animal Nutrition, LPM, LPT, Poultry and Dairy)										
3.	Para-clinical Competencies (Microbiology, Pharmacology, Parasitological, Pathology)										
4.	Clinical Competencies (Surgery, Medicine, Gynecology)										
5.	Any other (Please specify)										

3. Technical Subject Matter Application Competencies

Livestock Extension Professionals should:		How important is this task?					What is your level of knowledge and/or skills to perform this task				
		Not important	Some what important	Average	Important	Very important	Very low	Low	Moderate	High	Very high
1.	Demonstrate that they have basic knowledge in their discipline.										
2.	Understand the new technology being promoted, i.e., what it is, why and how it works.										
3.	Be able to educate community members about different types of risks and uncertainties (due to climate change, market fluctuations, disasters).										

4.	Refer to and make use of publications—journals, research reports, etc.										
5.	Demonstrate basic knowledge of livestock businesses, and help entrepreneurship development among extension clientele.										

4. Livestock Extension Program Development Competencies

Livestock Extension Professionals should be:		How important is this task?					What is your level of knowledge and/or skills to perform this task				
		Not important	Some what important	Average	Important	Very important	Very low	Low	Moderate	High	Very high
1.	Familiar with the vision, mission and goals of extension service.										
2.	Knowledgeable about national livestock development strategies, programs, and policies.										
3.	Able to engage stakeholders to conduct needs assessment and prioritize needs.										
4.	Able to allocate resources to address priority needs.										
5.	Able to engage local development partners such as NGOs, SHGs, and cooperatives in extension program.										
6.	Familiar with government administrative and financial rules and regulations.										

5. Livestock Extension Program Implementation Competencies

Livestock Extension Professionals should:		How important is this task?					What is your level of knowledge and/or skills to perform this task				
		Not important	Some what important	Average	Impor- tant	Very impor- tant	Very low	Low	Moderate	High	Very high
1.	Familiar with the vision, mission and goals of extension service.										
1.	Coordinate extension programs and activities within your jurisdiction.										
2.	Demonstrate teamwork skills to achieve extension results.										
3.	Engage local stakeholders in implementing extension program activities.										
4.	Demonstrate negotiation skills to reach consensus and resolve conflicts.										
5.	Follow participatory decision making model in extension work.										
6.	Delegate responsibilities to staff as needed.										
7.	Be able to engage women farmers and members of minority groups in extension work.										

6. Livestock Extension Program Evaluation Competencies

Livestock Extension Professionals should be able to:		How important is this task?					What is your level of knowledge and/or skills to perform this task				
		Not important	Some what important	Average	Impor- tant	Very impor- tant	Very low	Low	Moderate	High	Very high
1.	Understand theories and principles of monitoring and evaluation.										

2.	Conduct monitoring and evaluation of extension programs.										
3.	Develop data collection instruments for monitoring and evaluation of extension works.										
4.	Apply qualitative tools and techniques (e.g., focus group discussion, in-depth interview, etc.) to collect evaluation data.										
5.	Apply quantitative tools and techniques (e.g., survey) to collect evaluation data.										
6.	Analyze data (qualitative and quantitative), interpret data, and write evaluation report.										
7.	Share evaluation reports within their organizations and with stakeholders.										

7. Communication Competencies

	Livestock Extension Professionals should be able to:	How important is this task?					What is your level of knowledge and/or skills to perform this task				
		Not important	Some what important	Average	Important	Very important	Very low	Low	Moderate	High	Very high
1.	Respect local culture while communicating with clients.										
2.	Prepare monthly, quarterly, and annual progress reports of their works.										
3.	Share success stories and lessons-learned with stakeholders through various media.										
4.	Use various communication channels to disseminate										

	information about important extension activities and programs.										
5.	Possess good listening skills and listen to all clients and stakeholders.										
6.	Demonstrate good public speaking skills.										

8. Education and Informational Technology Competencies

Extension professionals should be able to use:		How important is this task?					What is your level of knowledge and/or skills to perform this task				
		Not important	Some what important	Average	Important	Very important	Very low	Low	Moderate	High	Very high
1.	Microsoft Excel for data entry and data analysis.										
2.	Microsoft Word for word processing (e.g., typing, editing, printing) and designing graphics.										
3.	Microsoft PowerPoint for making presentations.										
4.	Audio-visual aids such as charts, graphs, and puppet shows for teaching and learning.										
5.	Mass media like FM radio stations and television channels for communication.										
6.	Computers (email, Internet, and web pages) for communication.										
7.	Mobile phone services (e.g., texting, SMS service) for communication.										
8.	Social media like Facebook, WhatsApp etc										

9. Personal and Professional Development Competencies

Livestock Extension Professionals should:		How important is this task?					What is your level of knowledge and/or skills to perform this task				
		Not important	Some what important	Average	Important	Very important	Very low	Low	Moderate	High	Very high
1.	Practice principles of good governance (i.e., participation of clients, accountability to clients, transparency).										
2.	Show commitment to career advancement (participate in lifelong-learning, in service training programs, professional meeting and conferences).										
3.	Apply professional ethics in works, i.e. promote research based recommendation or technology, honesty and integrity.										
4.	Follow organizational policies and directives for in-service training and professional development.										
5.	Demonstrate positive attitude towards extension work.										

10. Diversity Competencies

Livestock Extension Professionals should:		How important is this task?					What is your level of knowledge and/or skills to perform this task				
		Not important	Some what important	Average	Important	Very important	Very low	Low	Moderate	High	Very high
1.	Understand that diversity exists within and among clients and stakeholders.										
2.	Identify the needs of women, small farmers and minority groups.										

3.	Develop extension programs to benefit women farmers.										
4.	Engage various social and marginalized groups in extension programs.										
5.	Do teamwork with diverse staffs at district and sub-district levels.										

11. If you feel there are additional competencies that livestock extension professionals need, but are not listed above, please write them.

1. _____
2. _____
3. _____

12. If you were to recommend three activities or programs to enhance core competencies among livestock extension professionals what would those recommendations be?

1. _____
2. _____
3. _____

13. What is/are the appropriate ways to acquire the above-mentioned core competencies? Please rate each way or mechanism on a scale from 1 to 4 as given below:

Ways to acquire core competencies:	Not appropriate (1)	Somewhat appropriate (2)	Appropriate (3)	Very appropriate (4)
1. Through <u>pre-service training</u> (e.g., undergraduate/graduate education in Veterinary colleges)				
2. Through <u>in-service Training</u> (e.g., training offered in Animal Husbandry Departments / Veterinary Colleges / Extension Education Institutes/ ICAR Institutes / Administrative Staff Colleges etc.)				
3. Through <u>basic induction training</u>				
4. Through national and international <u>seminars, workshops, webinars, etc.</u>				
5. Other (please specify _____)				

If you wish to receive final project report and e-manual on livestock extension, please write your e-mail here clearly in capital letters

Thank you very much for taking part in the survey

ABOUT THIS DOCUMENT

Core competencies -- both process and technical competencies -- are basic sets of knowledge, skills, attitudes, and behaviors that livestock extension professionals required to perform their tasks well. This USAID-funded project assessed core competencies of livestock extension professionals in India. The overall findings revealed a significant gap between existing and required core competencies -- both process and technical competencies. To fill the gap and acquire core competencies by livestock extension professionals, specific policy interventions at pre-service, induction and in-service levels are suggested.



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