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Strengthening extension research in animal husbandry: review of issues and strategies

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ABSTRACT

The crucial role played by animal husbandry extension resulted in 8.5 times increase in milk production, 43 times in egg production and 13 times in fish production since 1950s in India. However, extension especially its research component is often criticized for its inability to respond to changing ground realities in production and socio-economic scenario. Several studies, deliberations in seminars and conferences and viewpoints of experts and policy makers often emphasise the reorientation of extension research from diffusion and communication dimension to more of action oriented experimental studies keeping in view emerging areas of research like skill building, sustainability, climate change, commercialization, impact assessment, value addition and entrepreneurship. The strategies that could facilitate the reorientation include capacitation of extension faculties and students on advanced methodologies and statistical techniques, minimizing operational difficulties, networking and coordinated research, inculcating ethics and professional excellence and sensitization of extension researchers at their work place.

Key words: Extension research, Animal husbandry, Reorientation, Pluralism, Experimental designs

Extension systems in animal husbandry had contributed tremendously to its growth and development in India. Efforts made in the past have helped in raising production and productivity in most animal products. Consequently, India could achieve milk production of 155.6 MT, meat production of 3.04 MT, fish production of 10.16 MT and egg production of 78.48 billion during the year 2015–16. Extension *per se* carries, three dimensions with it *viz*., education, research and extension; while field extension serves as a platform for extension research, extension scholars try out various models and methods for serving clientele groups for effective transfer of innovations. These approaches, models and mechanisms collectively played constructive role in enhancing productivity of various livestock products thereby contributing to socio-economic empowerment of livestock holders (Ponnusamy *et al*. 2017).

Extension systems operate in five different streams in India namely, (i) State department of animal husbandry, dairying, ATMA, (ii) Extension wings of ICAR and SAUs/ SVUs, commodity boards, KVK, (iii) Cooperatives, (iv) Private entities, and (v) NGOs. They have immensely contributed for technology dissemination although their objectives differ from each other with respect to their mandates. Extension system in the animal husbandry sector is often stated to be weak in terms of adoption of recommended farming practices. In addition, extension research is required which can strengthen role and efficiencies of extension systems by generating policy inputs, models, mechanisms and approaches. Extension personnel (both at the university and state level) need to take a lead in fostering collaboration and networking between and among different agencies simultaneously to suitably respond to the market-driven economy.

Major issues of concern in extension systems of animal husbandry: The demands made upon transfer of technology for accelerating farm production are enormous and formidable. This involves complex task of inter-disciplinary and multi-institutional in approach and content. As a short-term as well as long-term strategy of development, a systems view of the extension organisation has to be taken for fostering the functional linkages involving NGOs, agribusiness, mass communication, media, education, local communities and farmer groups to assume greater roles in carrying out the extension teaching function (Radhakrishna and Veerabhadraiah, 2002) and creating synergistic effect (Prasad *et al* 1987). Further, an aggressive marketing of the discipline of extension is needed, especially in the context of other disciplines competing for many jobs in the areas of rural development, where extension had a monopoly in the past (Prasad, 2001). The extension research in animal husbandry is mostly handled by ICAR and SAUs/ SVUs. Most of the studies relate to ex-post facto research (NAAS, 2017), undertaken by post-graduate students at

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micro level using smaller sample size with limited funding. This could not generate adequate inputs for generalization and extrapolation, leading to rare utilisation of research findings for policy making, undertaking action oriented extension programmes. Faculties in SVUs undertake sporadic efforts due to lack of adequate fund allocation, forcing them to focus on service oriented activities. This leads to decreased research studies in wide range of socio-psychological, economic, welfare and environmental issues relating to animal husbandry sector. This situation has deprived opportunities to publish in peer reviewed journals, depriving opportunity to be considered as fellows in national academies like NAAS. Most of these studies focus on awareness, knowledge, adoption, diffusion, communication, training needs, constraints analysis and index development, often ignoring context of undertaking research in response to emerging needs, globalization, changing demography of clients, climate change and deterioration of natural resources (Ponnusamy 2014). Training in research methods at the postgraduate level is also very weak with limited attention given to qualitative research methods. In addition, development of depth in subject matter specialization skills are also lacking at the postgraduate level (Sulaiman and van den Ban 2000). Students also are not persuaded to conduct action oriented research as it requires inputs and inter-disciplinary efforts. Further, outputs from majority of diffusion studies could not provide clue for further direction and rectification of identified deficiencies or gaps. The outputs from these studies are mostly published in academic journals or presented in professional societies without reaching the actual end users (Prasad 2014).

It is widely felt that social science capacity in terms of number, quality, consistence, coherence, productivity, relevance, and linkages with ARIs and development agencies, NGOs, FOs, farmers in the NARS, is not only low but also decreasing. It is a concern which is often more expressed, sympathized than analyzed and redressed (Mruthyunjaya 2014).

The situation of livestock extension services is much serious. 'Report of the Working Group on Animal Husbandry and Dairying' for 12th Five Year Plan, indicated that livestock extension services are almost absent in the country and that made a clean platform for the need of an extensive brainstorming among the academicians and policy makers (Planning Commission 2011). State Animal Husbandry Department spend less than 1–3 per cent in their overall budget towards extension activities (Chander *et al*. 2010).

Weak extension and training services and the consequent lack of technological knowledge of farmers are often considered to be the major factors behind the insufficient adoption of improved technologies. This constraint could be overcome by improving farmers' access to information. Moreover, extension machinery in livestock sector with qualified officers often face difficulties in finding out alternative form of technologies as well as user friendly technologies to promote animal health, welfare for small holder dairy and goat farming systems. There is negligible activity in respect to piggery production, though individual's specialisation in these sciences renders services. Farmers look upon to animal husbandry departments for seeking information, however functionaries were not exposed to advisory role as they orient towards clinical aspects (Ravikumar and Chander 2011). Reaching to larger farming community in diversified farming, cultural barriers needs fine tuning of current extension strategies. Farmers consider animal husbandry departments' service as affordable than private functionaries and rely on them for their sustenance (Kathiravan *et al*. 2011). There is a need to have policy dialogue (as NAAS policy papers seldom take it into account) in important aspects of taking the scientific messages to the client system with the larger perspective of promoting livelihood security to millions of livestock keepers.

Expectation from extension researchers: Ponnusamy *et al*. (2017a) brought out the expectations of different stakeholders who are involved in promotion of animal husbandry in India (Table 1).

Status of extension research in animal husbandry: It is often stated that extension without subject matter content is sterile and subject matter without extension is building castle in the sand. The studies undertaken by researchers are repetitive type, generating same information without taking into consideration of changing needs and priorities of user systems. The importance of local leaders in enhancing scope of implementation, to reflect on necessities of farmers, maintenance of feedback have to be recognized for addressing the farmers requirements (Athilakshmy and Rao 2013).

Extension research often lacks innovative ideas and

Table 1. Expectation of stakeholders from extension researchers

Vice-chancellors/ Directors	Policy makers/ planners	Extension functionaries	Farmers	Students and fellow researchers	Input dealers and public
Extension models	Assessing factors favouring productivity and profitability	New models of technology dissemination	Free inputs	Advanced methodologies	Trends
Fast dissemination of information	Reasons of agrarian distress	Handling of advanced tools and techniques	Advisory services	Analytical techniques	Mindsets
Upscaling	Models for income enhancement	Effective solutions to burning issues	Enabling mechanism	Innovative research ideas	Future

interdisciplinary approach. Despite completion of more than 10,000 research projects in the form M.Sc., Ph. D and other research projects, there is still a difficulty to make generalization of research findings. The limited time spent by students with farming communities leads to lack of practical orientation in understanding and in solving farm level problems. Theory building and basic research are almost lacking in extension discipline. Outdated statistical tools and software are often used in extension research (Proceedings of 2nd meeting of Indian Extension Network, NDRI, Karnal, 2015). Research competencies of extension professionals need strengthening to formulate result oriented research projects and application of recent tools and packages of data analysis. The important recommendations emerged out of the seminars/ conferences/ brainstorming etc are never followed up by stakeholders in the research and extension system.

Research studies in general are carried out to provide valuable justification and interpretations to policy makers and planning agencies for taking efforts in crafting need based development programs. Extension research in this context takes a higher significance as it directly reflects to major work force of the country, its interests and livelihood. But, due to very many factors as and then mentioned researches in the discipline of extension education particularly in animal husbandry sector there is a huge dearth of coordinated outputs which has been reflected by its haphazard nature.

Infrastructure and manpower to conduct extension research in agriculture and allied fields are quite limited in the present higher education scenario. As an apple's bite, research in Indian agricultural academia has continually been shared by teachers/guides and students wherein the later make a considerable scientific contribution in the formers' research programmes. This have had been quite continual in some basic disciplines seeking for niche area researches while this is not happening in extension education as a whole. It would be possibly impossible to locate any niche area researches in extension education or to put it in to perspective, social sciences as a section. Nonetheless, valid research works have always been endured in the discipline of extension education at central and state owned institutions and many private entities as well; and have vividly contributed to the agricultural policy making at different strata.

Looking upon the subject matter of animal husbandry extension, past and contemporary researches largely have been focussing on diffusion and adoption levels of various livestock technologies and off late many research endeavours have been taken on Information and Communication technologies (ICT), adoption, training need assessment and communication behaviour. Themes chosen in these research initiatives have often fell in a wider spectrum varying as studies been undertaken based on livestock species, locality based, locally identified problem based, market oriented, self-interests, guide's interests and many more, under specific mandates of the institution. This really attracts reasons to amble around the concepts narrating national mandate, birds' eye view of looking at the issues, wider reach, covering the bounds etc., and opens the Pandora's Box to the new-age researchers on the so called concept "consolidation of extension researches". It is the high time to coordinate research works being undertaken by the scientists; at micro and macro level as well. Characterized by limited jurisdiction and smaller sample sizes, research on extension education fails to propel into the general stream which needs to be pondered upon by the budding research professionals who shall choose problems not only related to the local issues but also in themes rendering suggestions for a broader dimension of livestock sector on either species basis or on geography basis.

Recent initiatives in extension systems of animal husbandry: There are some recent initiatives from Agricultural Extension Division of ICAR such as extra mural funding, Farmers FIRST and sanctioning projects from National Fund for undertaking extension research in the country. Scientists also attempt to get funding from ICSSR, DST, NABARD, livestock boards, network projects from ICAR institutes etc. However, these projects are of sporadic attempts which may not help to generate inputs for policy making.

Role of research in strengthening extension systems in animal husbandry: It is only extension which can bring the desired transformation either doubling farmer's income, preventing farmer's suicide or ensuring food and nutritional security due to the enabling role and watchdog of prevailing socio-economic conditions among farming clientele. The extension system is still conceptualized as diffusion support process and treated as a linear process that is supply driven or top down by design. It is important to address various issues affecting functioning of extension systems in the country especially cost effective empowerment of small holder farmers particularly youth and women (Ponnusamy and Gupta 2004). There is a requirement to measure indicators in respect to success of programme, schemes and role of policies to motivate farmers in adopting new technologies, practices without exhausting limited development funds or resources.

The organization and structure of extension systems, as well as constraints to their functioning and changes needed to create improved and market-focused extension services by Krishi Vigyan Kendra (Agriculture Science Center) in India and other extension agencies need to be looked into from multiple perspectives. The capacity of extension agencies to conduct trainings in a participatory manner with local contextual training material needs to be strengthened. Ways to improve implementation, monitoring and impact evaluation are to be worked out. The local service providers could be strengthened through better linkages and communication in order to provide decentralized extension services. The systems should be made more equitable by linking gender, nutrition specific extension programs so that majority of small holder farmers can be facilitated to

practise livestock farming as more profitable enterprise.

It is important to focus next generation extension research in such a way that changes should eventually lead to mutual learning among clients rather than command and control of present extension systems in the country.

- Decentralization by way of deconcentration, delegation and transfer of extension authority to other structures for effective reach of technologies
- Effecting extension through multiple service providers through technological competence
- Working out methods for cost recovery strategies to make clients more responsible
- Improving management strategies in the context of importance- influence matrix
- Farming system research and extension & enterprise focus
- Group based participatory approach for bringing overall efficiency in extension systems

Extension system has to embrace contrasting pedagogical approaches, multi-disciplinary allegiances and contemporary skills and capabilities for bringing overall system efficiency in animal husbandry system. New models like public private partnership (Ponnusamy 2013), contract dairy farming (Ponnusamy and Walli, 2007), expert system (Ponnusamy *et al*. 2016) and client centric Pasu Sakhie women empowerment model (Ponnusamy *et al*. 2017b) would foster quick technology diffusion in rural India. Technologies must be tailored to new contexts if they are to be effective for promoting sustainable animal husbandry farming (Table 2).

Ways and means of improving animal husbandry extension research: It is vital to undertake interventions for improving extension research in animal husbandry sector by forcing on the emerging needs in context to globalization, changing demography, technology development and climate change. Emerging farming patterns in terms of duration of maintenance in moderately intense farms that are in general sustained by women have to be considered (Sudeepkumar and Thirunavukkarasu 2016).

Reorienting extension curriculum and faculty on recent advances: Quality of education would improve with strong research base in the academic institutions (Agrawal *et al.* 2013). A good initiative can be started by organizing a faculty up gradation programme wherein recent advances in extension approaches and impact assessment methodologies can be given special emphasis including the tools and techniques from the discipline of economics. The routine CAFT/ summer school/ winter school/ short courses of ICAR in the domain of agricultural extension are inadequate to serve the demand driven expectations of clients from extension researchers.

Strengthening capacity of students' statistical interpretation: The students should be motivated to focus on interpretation of findings of their research from clients' perspective in view of the fact that many of research scholars end up describing only results without explicitly explaining the utility of their findings. This needs major inputs from student advisory committee (SAC) headed by the Major Adviser.

Mechanism to regulate intake of students at PG level: The number of students to be admitted in masters and doctoral level should be according to the strength of faculty and resource availability in colleges. Otherwise, it will dilute the academic quality and professional ethics. Prioritised research problems as per the client needs may not be addressed and these situations may generate repetitive results and vague generalizations. Therefore, the intake of number of students should be determined according to the strength of the faculty members.

Communication process: Backward, hilly and remote regions had accessibility issues wherein livestock sector provides requisite nutritional and financial security. Effective ICT tools with farm information are seldom coded in tune with requirements of specialized regions.

The conventional approach of training is being carried out, however refinement of approach is needed in tune with changing circumstances. Technology enabled learning such as virtual learning, e- modules and mobile applications should get adequate focus for developing extension models and knowledge- led technology uptake. Provisions should be inbuilt for continued update of knowledge delivery based on extension research in any of the communication module which includes web enabled information delivery, expert system, mobile messaging, portal and other audio-video devices.

Stimulating people to acquire new knowledge: The research system from university has to orient young officers and scholars in taking up challenges that are reasonable and help to build their professional strength. This can help them to network with stakeholders like animal husbandry department and farmers to disseminate information in confident manner. The hierarchical social structure creates

Table 2. Key features and enabling factors of next generation extension system

Key features of next generation extension system	Critical success factors for future extension system in India
Responsive to the ever-changing client needs	Pluralism (Reliable information from all sources)
Pluralism (Multiple extension service providers)	Professionalism (Commitment to standards and ethics)
Technology-enabled extension methodologies (modern IT & ICT led methods)	Pragmatism (Strong belief in technology and social system)
Partnerships to harness comparative advantages of partners, farmers	Partnership / Networking (Synergy building)
More micro strategies aimed at promoting grass root level linkages	Prudence (Decision making in tune with demand)
	Pride (Intrinsic motivation and self-satisfaction)

stickiness of ideas and hence goal of university system is to enhance the skill of university officers beyond academics.

Strong methodological paradigm: Greater investment of time and effort is required in the areas of sampling procedures, analytical methodology and standardization of data collection tools and interpretation of findings from the user perspective. It is important to harness experience and approaches of other disciplines to cover extension methods and techniques, innovative research methodologies, frameworks, interface, socio-economic and psychometric analysis and quasi- experimental designs (NAAS 2017). This can be attained by involving outside experts in research project formulation, monitoring and impact assessment apart from bringing out quality publications.

Measuring impact of technologies: Seldom veterinary extension specialists measure impacts of the technologies or products shared or widely used by resource poor or richly endowed farmers. This had constrained their thoughts in evolution of technologies and adheres to conventional mode of technology development. Feedback and refinement of technologies are imminent and farmers were left with their own means to cope up. Tie up with field level agencies like cooperatives, NGOs, farmers' producer groups, SHGs, JLGs etc., would help extension researchers and project managers to assess the impact of the research results. This could be done through in an informal way or collaboration with field level agencies or a well-organized MoU based outsourcing. This will add value to the research outputs, by means of enhancing the credibility of the researcher and organization thereby creating the heightened attention of policy makers and planners. The government authorized milk cooperatives, veterinary hospitals can be a vivid resource to test the research outputs from animal and veterinary science.

Development of trust between different stakeholders: Energizing programme require active players who can communicate in tandem. This involves building up of trust and linking with community who derive benefit out of it. There is no large scale programme so far articulated by veterinary agencies in such arena. It has to go beyond technique of Artificial insemination and ability to unearth new challenges.

Minimize operational interference: Greater flexibility is needed and hence top management has to work out suitable approaches in providing space particularly logistic support in enhancing outreach programme. Young minds should not be constrained with operational difficulties as it drains flow of thoughts and thereby action.

Deriving inputs not from within but from outside: Extension specialist should not get too many inputs from within members which affect ability to think beyond. Recent development in farm animal welfare, interface with other departments, line departments help them to orient their thoughts. Moreover extension researchers should be encouraged to participate and use the generated inputs from various deliberations of seminars, conferences and farmer interaction meets for research project formulation. Later, they should motivate to share their findings and thoughts in such future meetings. This will help in addressing farmer's problem in a realistic manner.

Moving away from survey research to experimental designs: An extension model developed for one location may not even be replicable in the neighbouring village due to wide variations in location specificity of agriculture and farming communities. Therefore, researchers should be encouraged to work in number of villages to develop extension models, thereby meeting the requirements of clients in a realistic way.

Networking: Arbitrary research outputs in animal husbandry extension researches still remain and it is pertinent to realize it. There is no clarity nor direction nor specific address for the country as a whole, due to data pockets here and there. In order to rectify shortcoming, coordinated efforts in direction of species specific / societal commonness specific, issue based problems have to be identified by apex research organizations and proper working collaboration between central and state institutes needs to be accomplished. The results and interpretation obtained should reflect nature and possible solution for identified problems in a bird's eye-view representing compelling justification to planners to frame suitable development schemes benefitting in maximum proportions of the farming community. This would ensure consolidated conclusion, inference of research endeavor and enable researcher to have a deeper insight of subject matter science in his/her professional carrier.

Transforming extension education to extension endeavor: Continual to networking matters, it would be imperative to discuss about agricultural education, research and implementation nexus in the context of Indian sub-continent. Agricultural education in India has been undertaken by 63 universities wherein animal husbandry and veterinary education being undertaken by 12 veterinary universities. ICAR is the apex body governing agricultural education while Veterinary Council of India (VCI) does the part for imparting veterinary education. As per VCI (2016) altogether 46 veterinary colleges are functional in the country from where around 4000 veterinary students are graduating annually. Extension component in all the colleges are mandatory as a subject matter but real time extension activity in terms of service projects, research projects and field level enterprising endeavors are relatively lesser. Although some universities are having full time extension related units, issues need a thorough introspection in applying principles to transform extension education as field level extension endeavor.

Inculcating ethics and professional excellence: Too much dependence on online academic inputs, emergence of mushrooming private publishers, copy-and-paste of previous works as such often diminish the professional standards in the discipline of extension education. This can be addressed only through inculcating the value of professional ethics and standards among students and faculties.

Need for sensitization at place of action: Setting up of

desired goals to understand nature of action at farm/field is vital and delineating field work/office work creates hurdle to unlearn and learn for effective implementation. True nature of experimental wisdom cannot be harnessed in such atmosphere. This can help to know new relationships for improvising farm animal health care, productivity and communication with farmers. The base paper for the brainstorming session on "Strengthening Agricultural Extension Research and Education" conducted by NAAS on 09.07.2016 at New Delhi identified the specific thrust areas of research in extension (Table 3).

Therefore, it is highly important to sensitize the extension scientists of animal husbandry and policy makers through research studies, discussions, debates, policy briefs, etc. for orienting them to undertake research in the emerging areas of animal husbandry where they will be considered as vital stakeholders. Indian farmers, in the beginning, were hard to convince the benefits of new agricultural technologies. Currently, promotion of these technologies does not require great effort. The requirement is an approach (method and message) that helps to understand new roles of extension educators in the new market driven economy. The new roles may be in the form of information relative to competing in the world market, preparing produce for the market, post harvest technology, understanding of sustainability and environmental concerns. It is believed that such an approach and effort will instill confidence among farmers and other stakeholders.

Table 3. Thrust areas of extension research

	Thrust areas of research
1.	Mapping of socio-economic and socio-personal patterns of farming communities in different agro-ecosystems
2.	Climate change adaptation: typology, frameworks, policy and practice dimensions
3.	Process on co-production of adaptive knowledge and co management with multi-stakeholders
4.	Citizen science, agricultural sustainability and agricultural policies: livelihood implications (with regional and national priority)
5.	Trans disciplinary research in agricultural sector for plural knowledge
6.	Institutional innovations, extension reforms, dynamics of convergence and linkages in extension
7.	Skill gap analysis and capacity development of stakeholders
8.	ICT-led knowledge Management, usage patterns and impact
9.	Nutrition extension: awareness, dietary pattern, designing suitable interventions for nutri-smart villages
10.	Value chain analysis, market-led extension and agri-business model
11.	Technology and resource mapping for optimized use and suitable extension interventions
12.	New approaches and process of extension interventions, and social learning for climate smart agriculture
13.	Adoption and impact assessment of NARS technologies
14.	Nutrition security at household and individual level should be one of the major objectives of agriculture extension research and needs to be incorporated in extension curriculum
15.	Gender partnership in agriculture and gender sensitization

Extension systems have to work in tandem with changing agro-ecological and socio-economic conditions such as growing number of small scale holdings, resource poor farmers and women farmers, socio-economic environment, natural resource management, climate change and demand for generating higher return per unit area / livestock unit. A proper orientation of extension research would address certain alterations and adaptations at field level for better acceptance, adoption and success of technologies, generated not only from research system but from farmers' field as well. This requires change in mindset of extension researchers, sanctioning authorities of research projects, funding agencies and policy makers for vitality of extension research in the overall agricultural system. The thematic areas and dimensions of extension research as discussed in this paper would pave the way for contextualizing livestock extension system in desired direction.

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