Assessing the potential to change partners' Knowledge, Attitude and Practices on Sustainable Livestock Husbandry in India

Sapna Jarial[4], Harrison Rware[2], Pamela Pali[1], Jane Poole[3], and V. Padmakumar[5]
Affiliation: [1, 2, 3]International Livestock Research Institute, P.O. Box 30709 Nairobi Kenya
[4]International Livestock Research Institute, 65/ II Vasant Vihar Dehradun, Uttarakhand, India
[5] International Livestock Research Institute, ICRISAT Patancheru, Andhra Pradesh, India
Email: s.jarial@cgiar.org;h.rware@cgiar.org;p.pali@cgiar.org;j.poole@cgiar.org;
&v.padmakumar@cgiar.org

Keywords: Livestock, Value chains, Capacity, Uttarakhand, Jharkhand, Nagaland

Abstract

The Enhancing Livelihoods through Livestock Knowledge Systems (ELKS) addresses the knowledge gaps of partners by strengthening their capacity to apply technical, social and institutional research knowledge. To facilitate the capacity strengthening, an initial assessment of the Knowledge, Attitude and Practice (KAP) of livestock aspects was conducted in 2011 for Sir Ratan Tata Trust and its non-government and government partners in Uttarakhand, Jharkhand and Nagaland. The livestock species included cattle, buffalo and goats in Uttarakhand, goat and pig in Jharkhand and pig in Nagaland. In the partners self-assessment of capacities of the partners half the number of partners were trained on livestock production aspects over the past three years but even then, this capacity was less commensurate with the capacity that the partners built of farmers. Partners were more knowledgeable about large ruminant production and management activities than the same aspects for other animals. The respondents were trained on cattle, buffalo and pig value chain activities but none were trained on goat value chains. In an assessment of service provision, respondents reported that access to services and technological packages by smallholder producers was a constraining factor. They agreed that better services could be provided through improved partner coordination of services to farmers. The use of cross bred animals was limited to cattle and pigs, because cross breeds were reportedly associated with higher maintenance costs, lower disease resistance, and poor success of artificial insemination (AI) services. Controlled mating was promoted for all species but AI was promoted for cattle and buffaloes. Mating options for cattle were limited to the use of local bulls.Based on the partners' capacity reports, we identified the potential to engage the partners in policy dialogue processes, market research for products and enhancement of value chain activities, particularly for pigs, goats and buffaloes. Strengthening the value chain activities needs to begin with the value chain analysis (VCA) of the different species in the Uttarakhand, Jharkhand and Nagaland.

1. Introduction

Livestock production and marketing in India have contributed significantly to livelihood improvement. In the northern states, livestock production forms an integral and significant component of smallholder subsistence production systems. For example, in Nagaland, livestock constitutes 18% of the value of output from the agricultural sector (Kumar et al., 2007), while in Uttarakhand 70% of the workforce is engaged in livestock farming. In Jharkhand, the majority of farming households keep a range of livestock including cattle and buffaloes, which form a traditional role in their livelihoods but which also consume a significant proportion of livestock owners' time. Pigs in Jharkhand, constituted 8% of the total number of pigs in India, approximately 5% in Nagaland and 1.6% in Mizoram according to the livestock census of 2003.

Opportunities that exist for tackling India's rural poverty include the growing demand for livestock and its products in the urban and rural areas which emphasize the opportunity for increased livestock production through livestock development initiatives. Livestock production has the potential to become an economic enterprise that targets the poor and marginalized if the development focus is on the value chain approach (Sirohi and Chauhan, 2011). An enabling policy environment for livestock production in India also exists from the pro-poor point of view in government policies, new technologies and economic growth. Despite these prospects for increased livestock production, there still exists an unmatched potential for the supply for livestock products.

There has been slow development in the livestock sector in Jharkhand, Uttarakhand and North East (N.E) Region due to constraints such as feeding, nutrition and animal health constraints (Kathiravan, Thirunavukkarasu and Selvam, 2011; Birthal et al, 2002). The major farm level hindrances to improved production and productivity include low adoption of improved practices due to farmers' financial resource constraints particularly of the Scheduled caste (SC), Scheduled tribe (ST) and other backward castes (OBC) (Kathiravan and Selvam, 2011; Birthal et al, 2002). Pig production in Mizoram and Nagaland is mainly hindered by swine fever, nutritional deficiencies, and unhygienic management practices. In Uttarakhand, constraints to cattle production systems include the lack of feed resources which are (mainly linked to common property resources and) known to cause significant negative impacts on milk yields, livestock health and deterioration of the forest quality. Other constraints in this state include lack of improved breeds, poor livestock health and ineffective marketing facilities. Livestock production in Jharkhand is constrained by lack of good quality breeding stock, inadequate feed and fodder and higher incidence of Peste des petit ruminants (PPR).

In response animal production and marketing challenges, Enhancing livelihoods through livestock knowledge systems-ELKS, a TATA-ILRI partnership project is being implemented.

ELKS project employs value chain approach to ensure opportunity identification for increased market performance; value addition, and incentives for key actor linkages in service provision and markets. The project applies the innovation systems perspective to the value chain framework by acknowledging sources of innovation such as multi stakeholder organizations along the value chain whose institutions affect the process by which innovations are developed and delivered. The focus is on understanding how knowledge is exchanged; how institutional and technological change occurs by examining the roles and interactions of diverse agents involved in the development and delivery of innovations at all levels using partnerships, networks and stakeholder driven processes. Understanding the knowledge and institutional changes integrated by partners can be gained through the use of a Knowledge Attitude and Practice study (KAP) study of SRTT partners on the production and management practices.

A Knowledge Attitude and Practice (KAP) survey was conducted to collect information on what is known, believed and done (WHO, 2008) in relation to livestock production, management and marketing by the SRTT & its partners. At baseline level, the ultimate goal of the KAP survey is to strengthen the partners' capacity to apply the technical, social and institutional research knowledge for improving livestock-based livelihoods and value chains. However, prior to awareness creation, it is necessary to determine the environment in which awareness creation shall happen (Kaliyaperumal, 2004), including the knowledge gaps, beliefs or behavioral patterns that facilitate understanding and action undertaken in livestock management and marketing aspects. Within the context of this study, knowledge refers to the partners understanding of livestock (cattle, buffalo, pigs and goats) production and management within the value chain context, and barriers to service delivery at the baseline for comparison of livestock production and marketing with subsequent post-intervention KAP surveys.The study was conducted to establish baseline Knowledge, Attitudes, and Practices (KAP) of project partners and stakeholders with regard to cattle, pig, goat and buffalo production and management (breeds and breeding, health, feeds and feeding, housing), service provision and marketing.

2. Methodology

Seventeen participants representing thirteen ELKS partner organizations completed the KAP baseline tool during a workshop held at the Birsa Agricultural University (BAU) in Ranchi, Jharkhand state (Table 1) in May, 2011. Across livestock species, seven partners from Uttarakhand and Jharkhand were concerned with service provision for cattle, goats and buffaloes while six partners from Jharkhand and Nagaland were principally involved service provision for pig production.

Table 1: Background of Sir Ratan TATA Trust (SRTT) (ELKS) partner organizations

State	Districts:	Organization type	Partner	Livestock Species Focus	Number of partners
Uttarakhand	Pithoragarh, Tehri Garhwal, Chamoli	Government	1. Uttarakhand Livestock Development Board (ULDB)	Cattle	1
		NGO	1. Himmotthan Society (HS)	Goat/ cattle/buffalo	5
			2. Mount Valley Development Association (MVDA)	Cattle/buffalo/goats	
			3. Himalayan Gram Vikas Samiti (HGVS)	Cattle/buffalo	
			4. Central Himalayan Rural Action Group (CHIRAG)	Cattle/buffalo/goats	
			5. Sankalp Samiti Tharali (Sankalp)	Goats	
Jharkhand	Gumla, Deoghar, Khuntim. Ramgarh	NGO	1. Society for Upliftment of People through People Organization and Rural Technology (SUPPORT)	Pigs	4
			2. Network for Enhancement and Enterprises and Development Support (NEEDS)	Goats	
			3. Nav Bharat Jagriti Kendra (NBJK)	Pigs	
			4. Collectives for Integrated Livelihood Initiatives (SRTT CINI)	Pigs	
Nagaland	Mokokchung, Wokha, Kohima, Dimapur	NGO	1. Prodigals' Home (PH)	Pigs	3
			2. Sir Ratan Tata Trust – North East Initiative (SRTT – NEI)	Pigs	
			3. Agency for Porcine Foundation and Development of Nagaland (APFD)	Pigs	

Source:

The KAP survey baseline questionnaire contained questions about the background of the partners including their provision of services in TATA – ILRI villages and the KAP section. The knowledge section was sub divided into assessment of knowledge, training, materials used to train stakeholders, and whether the partners trained other stakeholders; the attitude section contained questions in four domains: the services partners provided, production aspects, markets and by laws and policies. The use of practices contained information about the partners' promotion of production, management and market/market chain practices.

Results and Discussion

Respondent Characteristics

Thirteen organizations participated in this study (. Nine of the participants were from Jharkhand and Nagaland could potentially provide services for pigs such as improved health service provision through trained village level para-vets, promote a pig nutrition package based on local resources, and improved care and management for breeding sows and piglets.

Table 2). These were mostly (12) non-governmental organizations (NGO) while one, the Uttarakhand Livestock Development Board (ULDB), is a government organization. Nine of the participants were from Jharkhand and Nagaland could potentially provide services for pigs such as improved health service provision through trained village level para-vets, promote a pig nutrition package based on local resources, and improved care and management for breeding sows and piglets.

Table 2: Characteristics of the respondents

	Gender (N=13)		**Type of Organization** (N=13)		**Level of Operation** (N=13)	
State	Male	Female	Government	NGO	State	National
Jharkhand	3 (23)	1 (8)	0	4 (31)	4 (31)	None
Uttarakhand	4 (31)	2 (15)	1 (7)	5 (39)	5 (39)	1 (8)
Nagaland	2 (15)	1(8)	0	3 (23)	3 (23)	0

Source: KAP survey data (% in brackets)

Services provided

Poor households require an array of services to enhance their capacities to exploit the full potential of livestock production. However, hindrances to service provision include ways and means to determine livestock constraints, poor service delivery and cost effective means of service delivery (Ahuja and Redmond, 2001). Our initial exploration of the service delivery methods showed that partners had neither a positive nor negative attitude about the method in which they provide services.

An overview of services provided by partners is shown in

Table 3. The shaded sections show services provided by each partner. ULDB, HGVS, CHIRAG, and MVDA provided services across the different management and marketing aspects for cattle, buffalo and goats. CHIRAG reportedly provided an array of services, across all aspects, but the larger organizations such as ULDB, did not provide health management services for cattle and buffaloes while HGVS did not promote technologies as a combined technological package. Less support was provided for pigs by SUPPORT, cInI and APFD. Fewer services were provided for pigs by partners who mainly promoted sty feeding, also, no one service was commonly provided by all the concerned partners as was the case with the services provided for cattle, buffalo and goats.

Table 3: Summary of service provision by partners

	Partner	ULBD	HGVS	CHIRAG	MVDA	SUPPORT	NBJK	SRTT - cInI	AFPD	PH	NEEDS	Sankalp	HS
	Livestock type	C/B	C/B	C/B/G	C/B/G	P	P	P	P	P	G	C/B/G/P	C/B/G
Combined technological packages													
Service provision	Training												
	Input supplies												
	Livestock management												
	Marketing												
Cross breeds	Cattle												
	Pigs												
Indigenous breeds	Goats												
AI	Cattle												
	Buffalo												
Combined stall feeding & grazing	Cattle												
	Buffalo												
Combined stall feeding & browsing	Goats												
Sty feeding	Pigs												
Concentrates	Cattle												
	Buffalo												
Silage	Pigs												
Keeping Livestock in the house	Cattle												
	Buffalo												
	Goats												
	Pigs												
Vaccination	Buffalo												
	Goats												
	Pigs												
Conventional medicines	Buffalo												
	Goats												
Change management	Pigs												
Promotion of producer groups													

Capacity building activities

Knowledge about the capacity building activities that partners were previously involved in and how this capacity is translated to other stakeholders including farmers is critical as an indication of the areas where capacities should be strengthened. We compared the partners' knowledge gained from previous training on breeding, nutritional improvement, value chain and policy aspects in livestock projects during the last three years to the service provision provided by the partners.

In the last three years less than half the ELKS partner organizations were trained on production or marketing aspects for any species. Topics that were most trained on for all species were breeding, housing, health management practices with one or two partners receiving training for all livestock species, followed by nutritional management aspects (5). The aspect that was least trained on was value chain management. Two partners from Jharkhand and Uttarakhand were trained on cattle value chain management, and training on this aspect was even lower for buffalo (1) and pigs (1). From Uttarakhand no partner was trained on pig value chain as piggery is not a priority species in this region. No partner had been trained in goat value chain management in the last three years. Interestingly, no training on goat nutrition improvement program had ever been provided by any of the partners. In Uttarakhand, this could be because partner NGOS have not secured funds for their goat proposals by government and funding agencies.

Table 4: Training received and provided

States	Aspect of training	Number trained	Number who trained others
Jharkhand/Uttarakhand (n=7)	Cattle management practices	2	3
	Cattle nutritional improvement	3	2
	Cattle value chain activities	2	1
	Buffalo management practices	1	0
	Buffalo nutritional improvement	1	1
	Buffalo value chain activities	1	0
	Goat management practices	2	1
	Goat nutritional improvement	1	0
	Goat value chain activities	0	0
Jharkhand/Nagaland (n=6)	Pig management practices	1	3
	Pig nutritional improvement	0	1
	Pig value chain activities	1	0
All states (n=13)	Participatory dialogue	2	0

Source: KAP Survey data

Only three partners had reportedly trained others in livestock production and management practices, in the last three years despite nine partners reportedly providing capacity building amongst the bouquet of services they provide. This disparity probably arises because participants who attended the meeting were higher level officials (management) and not technical persons involved in capacity building

activities.More capacity was received by partners on cattle and pig production and management than they were reportedly providing services for. For example, limited services were provided for cattle in Uttarakhand, however, up to 50% (n = 2-3) partners had been trained in cattle management practices, nutritional improvement and value chain management practices in Uttarakhand and Jharkhand**Error! Reference source not found.**.

We asked partners to make a self-assessment of their knowledge about project management aspects. Table 5shows that more than 45% (7) of the respondents rated their current level of knowledge on M&E, integration of gender into project design and implementation (5), as goodTable 5.

Table 5Knowledge about project management related aspects

Project management aspects	**Good**	**Average**	**Poor**	**Very Poor/Not exposed**
Business management (N=11)	3	3	2	3
Project management (N=11)	5	3		3
Monitoring and evaluation(N=11)	7	1	1	2
Participation in policy dialogue(N=11)	3	4	1	2
Integrating gender into project design and implementation(N=11)	5	2	1	2

Livestock Production and Management practices Promoted by ELKS Partners

Livestock production and management practices promoted by partners have an important bearing on production and performance of livestock. Poor knowledge of agricultural technologies and lack of up to date information about modern agricultural technologies has been reported to lead to food insecurity at the household level (Barkat et al, 2006). Attitude is manifested through practice by changing the behavior of a person or persons in an organization (Barkat et al, 2006). Positive attitudes that partners have towards services they provide can be reinforced through the use of improved technologies and engagement in value chain activities. Partners were asked to agree or disagree on a five point scale (strongly agree to strongly disagree) with attitude statements in four domains (production, service provision, marketing and policy) domains.

Four partners disagreed and two strongly disagreed with the statement that partners work independently within districts therefore it would be challenging to organize themselves into a harmonized and more coordinated effort to provide services (Table 6). However, an equal number (6) agreed that the partners did in fact operate independently to provide services. In a similar attitude statement phrased differently, eight respondents reported that access to services and technological packages by smallholder producers was more constraining than factors such as swine fever control and adoption of clean hygienic practices for pigs, and shortage of fodder for large ruminants and goats. They agreed that access to services provided by partners could be improved through better co-ordination of service provision in the concerned districts.

This implies that better services could be provided through improved partner coordination in addition to the provision of technological packagesTable 6.

Table 6 Partners' attitudes

Attitude Statement[1]	Partner (s)	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Access services for Pig/goat production in Jharkhand state is a much bigger issue than the control of swine fever and the adoption of clean hygiene practices (n=13)	CHRAG, CINI, HS, MVDA, NEEDS, PH, SUPPORT, SRTT		8			
	APFD, HGVS, NBJK			3		
	SST, ULDB					2
	Total		8(62)	3(23)		2(15)
Backyard pig/free range goat production is a way of life and HH income from production cannot be increased (n=13)	CHRAG, SUPPORT, SRTT, HGVS, NBJK	5				
	HS, PH				2	
	NEEDS, APFD		2			
	SST, ULDB, MVDA,CINI					4
	Total	5(39)	2(15)		2(15)	4(31)
No favourable by laws and policies supporting the management (feeding, health, breeding, housing) production, productivity and marketing of pig/goat in the Jharkhand region exists (n=12)	CHRAG, MVDA,SUPPORT, SRTT		4			
	CINI, APFD			2		
	NEEDS	1				
	PH, NBJK, ULDB					3
	SST, HS				2	
	Total	1(8)	4(33)	2(17)	2(17)	3(25)
HH incomes for pig/goat keeping families in Jharkhand state could be doubled with improved backyard pig production or free range got production (N=13)	CHRAG, HS, MVDA, PH, SUPPORT, HGVS, NBJK	7				
	CINI				1	
	NEEDS, SRTT, APFD, SST		4			
	ULDB			1		
	Total	7(54)	4(30)	1(8)	1(8)	
Partners (NGO's and similar groups) work independently of one another within districts hence it would be challenging to organize themselves to implement an integrated pigs/goat service delivery program (n=13)	CHRAG, MVDA, SUPPORT,SRTT				4	
	CINI, HS, NEEDS, PH, APFD, SST		6			
	HGVS, NBJK					2
	ULDB			1		
	Total		6(46)	1(8)	4(31)	2(15)
Pig/goat producers mostly sell their pigs/goats and pork/goat meat at the farm gate (to traders/middlemen) because other market outlets are inaccessible, however they are unaware of the high transaction costs that they are charged (n=13)	CHRAG, PH			2		
	CINI				1	
	HS, MVDA, NEEDS, SUPPORT,SRTT, APFD, HGVS,NBJK, ULDB		9			
	SST					1
	Total		9(69)	2(15)	1(8)	1(8)
Controlled mating (selection of specific boar/buck to mate with the sow/de) is mainly practiced to reduce pig/goat mortality and increase pig/goat productivity in Jharkhand State (n=12)	CHRAG, CINI, MVDA, NEEDS,PH, SUPPORT, SRTT, APFD, ULDB		9			
	HS, SST			2		
	NBJK				1	
	Total		9(75)	2(17)	1(8)	
It is not easy to improve the production and productivity of pig/goat because pig/goat owners perceive the use of improved feeding and breeding practices as expensive and too time consuming (n=12)	CHRAG, SRTT				2	
	CINI, HS, MVDA, NEEDS, PH, SUPPORT, APFD, NBJK, SST, ULDB	10				
	Total	10(83)			2(17)	

Source: Kap survey data

[1]The attitude questions differed by state and the focus animal the state.

More partners rated themselves as knowledgeable in cattle management and nutrition Table 7**Error! Reference source not found.**. Four partners reported that they had a good knowledge of cattle management and nutrition improvement. Two and one partner(s) reported a very poor knowledge of, or were not exposed to, cattle production and management and nutritional aspects respectively. The result was different for buffaloes. An equal number (3) reported that they had a good knowledge about buffalo management practices as those who reported poor knowledge or non-exposure to buffalo management practices.Three partners made an average assessment about their knowledge of pig management and nutritional aspects while two partners reported a very poor knowledge of, or were not exposed to, these aspects. Despite that only one partner reportedly received training on pig production and management, more self-assessments were rated as average than any other category. This knowledge could have been gained knowledge from informal training. Knowledge assessments about goat production and management were almost similar to the results for pigs (mostly assessed as average for production, management and nutritional aspects), however two partners (compared to one for pigs) rated their knowledge about goat management and nutrition practices as good.

Table 7: Knowledge about livestock production and management practices

States		Management practices	**Good**	**Average**	**Very Poor/Not exposed**
Jharkhand and Nagaland (n = 6)	Pigs	Pig management practices (health, Breeding, Housing)	1	3	2
		Pig nutrition improvement program	1	3	2
Uttarakhand and Jharkhand (n=6)	Goat	Goat management practices (health, Breeding, Housing)	2	3	1
		Goat nutrition improvement program	2	3	1
	Cattle	Cattle management practices (health, breeding, housing)	4		2
		Cattle nutrition improvement program	4	1	1
	Buffalo	Buffalo management practices (health, Breeding, Housing)	3	1	2
		Buffalo nutrition improvement program	2	2	2

Source: KAP Survey data

Breed and breeding practices

A quarter of the partners promoted the use of cross breeds for pigs and cattle but none reported this practice for goats and buffaloes. Low use of cross breeds has been reported by Deka and Wright, (2010), Sharma et al, (2007) and Birthal, (2002) in Jharkhand, Uttarakhand and India respectively. Birthal (2002) reported slow adoption rates of 7.5% and 15% for cattle, and pigs respectively. According to partners, cross breeds were seldom promoted due to higher associated maintenance costs than

indigenous breeds, and lower disease resistance. Poor adoption of cross breeds due to lower resistance of cross bred cattle has also been reported by Birthal, (2002). The Jersey cross breed (Jersey X HF cross) was promoted for cattle by HGVS, ULDB and CHIRAG, while SUPPORT promoted the Tamworth X Desi breed. For pigs SRTT - cInI, APFD promoted the large black and Hampshire breeds respectively. The widest variety of indigenous breeds that were promoted by NEEDS was for goats.

Table 8: Breeding practices promoted

Breeding practices	Cattle	Buffalo	Goat	Pigs
Use of controlled mating (n=15)	4	4	4	3
Use of artificial insemination (n=7)	5	2	0	0
Use of cross breeds (n=6)	3	0	0	3

Source: KAP Survey data

Partners reported contradictory attitudes about livestock breeding practices. They concurred with livestock owners' perceptions that improved breeding practices were expensive, and therefore hindered improvements in livestock production and productivity, however partner attitudes towards breeding practices were generally positive. More partners (9) agreed that controlled mating (described as the selection of specific boar or buck to mate with a specific sow or doe in this study) was aimed specifically at reducing animal mortality. Only one respondent (NBJK) disagreed. Controlled mating as a breeding strategy was mainly promoted by partners across all species while artificial insemination (AI) was promoted for large ruminants only. In India, about ten percent of the breedable cow and buffalo population have used AI as a mating strategy (de Haan, not dated). Feeds, feeding practices and feeding constraints

Conclusions

There was a difference between partners whose capacities had been built and those who had built capacities of other stakeholders. Half the partners had been trained but only one third of these partners reported that they had provided capacity building services to other partners. The capacity built was limited to livestock production and management practices for all species except buffaloes. Capacities were limited in value chain management aspects (with the exception of goats) and policy dialogue probably because these aspects were not the participants' area of expertise. No training was provided for buffaloes.A general comparison of partners' self-assessments across categories showed higher knowledge levels about project related aspects than animal production and marketing aspects but comparisons between the latter two aspects showed that knowledge about market aspects were perceived to be lower than for livestock management practices. This result is congruent with partners' capacity building level where capacities have been enhanced primarily on livestock management practices for all species and limited in value chain management. A comparison across categories for all species shows that knowledge levels for livestock production aspects are higher for cattle than for the small animals. The reverse was true for the marketing aspects where higher statistics were reported as average for goat and goat product and value chain aspects. Expectantly the level of knowledge was

consistently low for buffalo across both production and marketing aspects again consistent with the zero input on capacity building for this livestock type. Capacities on livestock production and management have been limited and more so for market aspects and policy dialogue with the result that the partners' perception in these aspects is consistent with this low capacity.

Partners need to work together to provide more synchronized and coordinated services to enhance, and even double, incomes of livestock owners. An attitude change is required in the notion that improved feeding and breeding practices are expensive and time consuming. Positive attitudes need to be re-enforced in the increased potential for backyard production for increased incomes and transformation to semi commercial production. While attitudes were positive on marketing aspects, limited marketing activities were promoted for all livestock by the partners. This, alongside limited promotion of cross breeds by partners for only pigs and cattle, would need to be reversed to increase market led production and productivity.

Partners' capacities need to be enhanced in animal management aspects (use and promotion of cross breeds, participation and strengthening value chain activities). Value chain activities that most partners reported were engaged in were the organisation of the livestock producers into marketing groups. Strengthening value chain activities needs to begin with the value chain analysis by the different stakeholders. With the innovation systems method that uses value chain approach; this shall be entirely possible by ensuring a stakeholder analysis at the state level to provide an inventory of the stakeholders available at the baseline.

References

Ahuja, V., M Rajasekhar, M., Haju, R., (2008) Animal Health for Poverty Alleviation: A Review of Key Issues for India. Background paper prepared for "Livestock Sector Review" of the World Bank

Ahuja, V., and Elizabeth Redmond, 2001. Economic and Policy Issues in Livestock Service Delivery to the Poor. Background paper for the FAO project memorandum "Pro-Poor Livestock Policy Initiative: Fostering the Policy Dialogue in Support of Equitable, Safe and Clean Livestock Farming".

Barkat, A., Khan, A.H., Mohib, K.A., Ahaduzzaman, S., Hoque, S., (2006). Study on Knowledge, Attitude, and practice (KAP) of resource farmers of foshol-CARE Inaternational

Birthal, P. (2002). Technological Change in India's Livestock Subsector: Evidence and Issues In Birthal, P. and Parthasarathy Rao, P. (eds). 2002. Technology options for sustainable livestock production in India: proceedings of the Workshop on Documentation, Adoption, and Impact of Livestock Technologies in India, 18–19 Jan 2001, ICRISAT-Patancheru, India. New Delhi 110 012, India and Patancheru 502 324, Andhra Pradesh, India: National Centre for Agricultural Economics and Policy Research and International Crops Research Institute for the Semi-Arid Tropics. 220 pp. ISBN 92-9066-444-4. Order code CPE 137.

de Haan., C. (Not dated) Livestock Breeding Technologies and Rural Development. Development Experiences http://siteresources.worldbank.org/INTARD/843432-1111149860300/20434421/_LivestockBreedingTechnologies.pdf Accessed 18122011

Kaliyaperumal, K., (2004). Knowledge, Attitude and Practice Study on Diabetes and Diabetic Retinopathy among Medical Practitioners in Southern India. *Community ophthalmology*, Vol. VI, No.2, April - June 2006.

Kathiravan G, Thirunavukkarasu M. and Selvam S., (2011). Time, costs and farmers' perceptions: The case of livestock service delivery in tamilnadu Veterinary World, 2011, Vol.4(5): 209-212

Kumar, A., Staal, S., Elumalai, E., Dhiraj K. Singh, D.K. 2007. Livestock Sector in North-Eastern Region of India: An Appraisal of Performance *Agricultural Economics Research Review.* Vol. 20 July-December 2007 pp 255-272.

Sirohi, S. and Chauhan, A.K. (2011). Current scenario of livestock development and potential interventions for livelihood improvement: Case of Jharkhand, India. Background Paper. ELKS Publication Series 2. Nairobi, Kenya, ILRI.

World Health Organization (WHO), (2008). Advocacy, communication and social mobilization for TB control: a guide to developing knowledge, attitude and practice surveys. WHO/HTM/STB/2008.46, ISBN 978 92 4 159617 6