

# Reframing technical change: livestock fodder scarcity revisited as innovation capacity scarcity : Part 1. A review of historical and recent experiences

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Andy Hall, Rasheed Sulaiman V., Mona Dhamankar, Peter Bezkorowajnyj &  
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# **Reframing technical change: Livestock Fodder Scarcity Revisited as Innovation Capacity Scarcity**

## **Part 1. A Review of Historical and Recent Experiences**

Andy Hall<sup>1</sup>, Rasheed Sulaiman V.<sup>2</sup>, Mona Dhamankar<sup>3</sup>, Peter Bezkorowajnyj<sup>4</sup>, Leela Prasad<sup>5</sup>

### **Abstract**

This is the first in a series of three papers that develop a conceptual framework for a project on livestock fodder innovation. Livestock is important to the livelihoods of poor people in many regions of the developing world. A generic problem found across this diverse range of production and marketing contexts is the shortage of fodder. This paper argues that to address this problem it is necessary to frame the question of fodder shortage not from the perspective of information and technological scarcity, but from the perspective of capacity scarcity in relation to fodder innovation. To support this position the paper presents case studies of experience from an earlier fodder innovation project. These cases suggest that while fodder technology is important, it is not enough. There is a large institutional dimension to bringing about innovation, particularly with respect to the effectiveness of networks and alliances needed to put technology into use.

**Key words:** Livestock; agriculture; innovation; poverty reduction; technology; partnerships; India; Nigeria

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## 1. Introduction

Technical change has played a major role in the rural development strategies of most developing countries over the last half century. This is a strategy that is as notable for its failures as its successes in countries that usually rely on either technology imports from the developed world or research-driven technology transfer. This is the first of a set of three linked papers that develop a conceptual framework to revisit this conundrum. The framework developed draws inspiration from contemporary ideas about innovation. The empirical focus of the papers is the case of livestock fodder scarcity — a particularly intransigent problem that UNU-MERIT, ILRI, and their partners are trying to apply the innovation perspective to.

Livestock is important to the livelihoods of poor people in many regions of the developing world. A generic problem found across this diverse range of production and marketing contexts is the shortage of fodder<sup>6</sup>. The reasons range from increasing competition for resources to environmental degradation in common property areas and the need to increase animal intake in intensive production systems. This is not a new problem and the agricultural research community has made considerable efforts over the last 40 years or so to develop new fodder technologies and to introduce new fodder varieties and feeding systems.

While there have been successes, this research — and associated efforts to disseminate fodder-related technologies — has made limited progress in resolving the fodder scarcity problem. This is particularly disappointing because maintaining or improving livestock production and marketing could have important social and economic consequences for poor people with livestock-based livelihoods. In addition, upgrading throughout the livestock value chain is needed to survive, cope and compete in dynamic production and market conditions at sub-national, national and global scales.

The International Livestock Research Institute (ILRI), UNU-MERIT, The International Crops Research Institute for the Semi Arid Tropics (ICRISAT) and the International Institute of Tropical Agriculture (IITA) are collaborating on a research project to explore fodder scarcity from a new perspective. This new perspective involves exploring ways to strengthen the capacity to innovate. To make the same point differently, the research will frame the question of fodder shortage not from the perspective of information and technological scarcity, but from the perspective of capacity scarcity in relation to fodder innovation.

In recent years, attempts to deal with the shortcomings of a technology-led approach to innovation have led to the emergence of a number of principles on how to move forward: the need to recognise the complexity of farming as part of a wider system of social and

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<sup>6</sup> The term fodder is used in the sense of plants grown specifically for feeding animals. These include grass, legume and tree species as well as crop residues.

economic activity; the need to create patterns of interaction between different sources of agricultural knowledge; the need to change the working practices of pivotal organisations, particularly agricultural research organisations, but also others in the development sector; and the need to create an enabling policy environment for technical change. These ideas have led to an increasing focus in rural development policy on innovation rather than research (see World Bank 2006).

Much of the contemporary policy debate on technology and economic performance is founded on similar concepts. Critical to this viewpoint is the recognition of innovation as a systemic, embedded phenomenon where the capacity to respond to change by a process of continuous innovation assumes importance over specific technologies and is the result of the particular patterns of interaction of many players in a specific context. In other words, rather than just giving emphasis to the creation of knowledge and technology through research, the new perspective emphasises the whole range of processes, factors and actors that shape how knowledge is created, adapted, diffused, shared, and most importantly, put into use. This emphasis on using knowledge in economically and socially significant ways — as the definition of innovation would suggest — resonates very strongly with growing levels of accountability in public interventions like agricultural research, where impacts articulated in welfare terms are taking precedent over outputs articulated in technological terms.

One of the ways these ideas are being brought to bear on development policy debates is through the concept of an innovation system. It is this idea that takes centre-stage in the research project, undertaken by ILRI, UNU-MERIT and its partners, which this paper discusses. The geographic focus of this work is India and Nigeria.

This discussion paper is one of three linked papers prepared to provide a conceptual framework and methods guidelines for conducting this research. This first paper reviews the historical experience of developing and promoting fodder technology and, in particular, the lessons learnt from the approaches experimented with in an earlier phase of this current project (for convenience this earlier work is referred to as Phase I). The second paper will review the conceptual and empirical literature dealing with recent thinking on agricultural innovation and builds on this to develop a conceptual framework for exploring fodder scarcity from a systems-of-innovation perspective. The third paper will review methods and tools for conducting this sort of research.

## **2. Historical Perspectives on Addressing Fodder-Feed Scarcity through Research, Technology Development and Promotion**

### **Fodder scarcity and the poor**

An adequate supply of livestock fodder is crucial to the livelihoods of millions of people across the developing world. Livestock producers meet their fodder requirements through a combination of crop residues and grazing on common lands, private lands, forests, fallow agricultural lands and harvested agricultural lands. Fodder requirements are also

met through cultivated forage crops (cultivated mostly by large landholders). Others purchase this fodder. Availability and access to quality fodder resources, however, is emerging as an important constraint in livestock production. Increasing fodder and water shortages are recurring phenomena, not only in arid and rain-fed regions, but also in irrigated areas and regions receiving higher rainfall. A policy push toward more productive but input-intensive breeds has also increased the demand for more fodder. At the same time, the shrinking of common property resources (industrial use, plantations, etc.) and the deterioration in their quality has reduced the availability of grazing lands.

The estimated doubling of demand for meat and milk in developing countries in the next two decades offers significant opportunities to poor livestock producers to increase their income from livestock farming. Livestock is important not only to farmers who own farmland and practise mixed crop-livestock agriculture, but also to a large number of landless people who depend mainly on common property resources for fodder and to pastoralists who migrate with their livestock. There are 20 to 25 million pastoralists in Sub-Saharan Africa and similar numbers in South Asia. The chief difference between the two regions is that in Sub Saharan Africa pastoralists tend to be cattle-keepers, whereas in South Asia they mainly keep small ruminants — sheep and goats.

Livestock is also increasingly becoming a fully commercial (industrial) enterprise in regions that are well-connected with milk markets in cities and big towns. It is estimated that in India alone almost 18 million people derive their livelihood from livestock.

### **Fodder technology development and transfer: Fodder scarcity as technology scarcity**

The major approach for addressing feed and fodder scarcity traditionally revolved around evaluating various forage crops (grasses, shrubs, trees) for their yield, nutritional content and impact on livestock production parameters (e.g. milk yield, liveweight gain), and then disseminating this knowledge as fodder technology (usually embodied as seed of improved varieties and their management and use) through animal husbandry departments and dairy development agencies. To support production and availability of these improved seeds, the national/state governments often established fodder seed production farms. Apart from making these seeds available to public sector agencies for wider distribution, these farms also served as demonstration and training units for fodder promotion. Lack of availability of quality fodder seeds was initially considered to be the main reason for limited availability of fodder and so the approach was to develop improved varieties of fodder crops through research; multiply them in fodder seed farms; distribute the same along with information on their benefits and use (extension). The key assumption was that lack of technology was the key constraint and that research could address this problem.

At the global level ILRI, The International Centre for Tropical Agriculture (CIAT in its Spanish acronym), and the International Centre for Arid and Dryland Agriculture (ICARDA) — international research centres of the Consultative Group for International Agricultural Research (CGIAR) — have taken a lead role in fodder research (evaluation



of different crops and varieties and developing better systems of production and management). Other CGIAR centres — ICRISAT, IITA and the International Centre for the Improvement of Maize and Wheat (CIMMYT in its Spanish acronym) — have, often in partnership with ILRI, CIAT and ICARDA, concentrated on developing dual-purpose varieties for grain and fodder (e.g. sorghum, cowpea, maize). National programmes were established in many developing countries during the 1960s and 1970s to test improved genotypes in forages to generate forage production technologies relevant to the socio-economic conditions in different agro-climatic regions. Technologies on managing pasture lands have also been developed through this network of international and national agricultural research organisations.

With little evidence of adoption in farmers' fields, fodder researchers in the 1990s began experimenting with participatory research approaches, i.e., engaging farmers directly in technology development and testing. This was expected to better match varietal characteristics with the real needs and interests of livestock producers. The process ranged from getting feedback on fodder varieties from livestock producers before releasing the varieties, to the provision of a range of forage species (grass, legumes, trees) for farmers to experiment with ('baskets of options'), to creating forage systems best suited to their farming conditions. "The underlying principle was to give farmers ingredients and information (and not recipes." (Hill and Roothaert, 2002).

Researchers have evaluated forages for adaptation and yield at many sites throughout the tropics over the last 20 years, including through regional networks convened by CIAT and ILRI with their national partners in Latin America and Sub-Saharan Africa (Toledo and Schultze-Kraft, 1982; Dzewela, 1988). However, although a range of species has been evaluated and superior accessions for a range of environments and farming systems or niches identified, the germplasm available in the genebanks of CIAT, and ILRI has not yet been widely adopted by smallholders (ILRI, 2006). Experience from the Indian Grasslands and Fodder Research Institute (IGFRI) is no different. "Even after investing enormous amounts of scientific manpower and economic resources for more than 25 years, IGFRI's efforts generally fail to serve the majority of the farmers, especially small-holder farmers in rain-fed areas." (Biradar and Ramesh, 2002).

### **New players and experiments in fodder supply**

Although fodder research and development is still publicly funded and directed in most developing countries, recent years have witnessed a number of private companies getting involved in fodder seed multiplication and distribution. In India, for example, the organised private sector dairy industry has taken an interest in fodder promotion. There have also been several experiments in fodder delivery promoted by co-operatives and NGOs. For example, Krishna (Dairy Co-operative) Milk Union in Andhra Pradesh experimented with "satellite fodder farms" to decentralise fodder availability. Some villages in Andhra Pradesh in southern India have emerged as fodder seed (multiplication) villages where farmers grow fodder crops to produce seed for sale.

Following the renewed interest in indigenous knowledge in recent years, several NGOs have initiated efforts to document the traditional knowledge on livestock production, feeding and fodder systems. Organisations like the Andhra Pradesh Grazing and Fodder Forum (ANTHRA) in India have documented the species traditionally used as fodder and have also validated their nutritional qualities. Moreover, many of these NGOs also have a strong focus on poor people in livestock development and have attempted to understand the fodder scarcity issue. Some NGOs, such as the Bharatiya Agro Industries Foundation (BAIF) in India, have been experimenting with different systems of fodder management under sylvo-pastoral systems. Others, such as the above-mentioned ANTHRA, have started to advocate policy change in relation to fodder. Policies related to land use, grazing, forest management and wasteland development influence the availability and use of fodder and, in particular, affect landless, nomadic livestock keepers who rely on these areas.

It is now apparent that the availability of and access to fodder is no longer a mere technological issue, although new knowledge on fodder continues to be important. The next section looks at the experience of an earlier phase of ILRI's fodder promotion work in order to draw out some more specific principles for reframing the fodder scarcity question.

### **3. Project Phase I (2003-2006). The Transition to a New Approach for Dealing with Fodder Scarcity**

#### **Project origins and approach**

The Phase I project, as originally conceived, framed the problem of fodder scarcity as one of technical and information scarcity on fodder production. Its central approach involved identifying and disseminating new varieties of fodder or dual-purpose crops aimed at increasing fodder supply. This involved participatory selection<sup>7</sup> of fodder options with an emphasis on genetically-improved germplasm and new planting designs. The project used the language of “scaling-out” to describe the way technologies would diffuse beyond the project scale; and “scaling-up” to describe the way an enabling environment for technical change would be created at the level of national policy. Scaling-out was envisaged as taking place through farmer-to-farmer exchange and the dissemination activities of development organisations partnering with the project. Scaling-up in the policy process was largely not addressed by the project.

During Phase I it became clear to the project team<sup>8</sup> that the approaches of the project — that were broadly of a technology transfer type — were not adequate to facilitate changes likely to lead to a reduction in fodder scarcity. As the project progressed it became apparent that, in fact, technical change was going to need the co-operation of many players related to the livestock sector and that this, rather than the technical robustness of particular fodder varieties, would determine success.

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<sup>7</sup> i.e. with the participation of farmers

<sup>8</sup> This consisted of ILRI social and mainly livestock scientists

In the meantime the project had inherited a number of different fodder-related activities — usually building on ongoing programmes of partner organisations<sup>9</sup>. The role of the project was to support these ongoing activities — mainly by the provision of improved planting material. These different initiatives (some of which are discussed in detail in the next section), in many senses, developed a momentum of their own. They were managed by partner organisations — both public research organisations and NGOs — and while fodder was a common interest, they all pursued strategies that reflected imperatives and mandates of their organisations and the particular context in which they were working. So, for example, while the research organisations gave priority to promoting varieties they had developed, the NGOs tended to have a more broadbased interest in helping their constituencies of rural communities.

Meanwhile, the project team realised that it would be useful to document these different experiences and use lessons from them as a foundation for developing a more effective way to deal with the fodder scarcity problem. Recognising that the scope of partnership was likely to be a critical concern in any approach developed, the project had the foresight to commission studies of the patterns of interaction of its project activities in particular rural domains. These studies reveal important gaps that enabled the project to learn from its own mistakes (see case studies below). The project also supplemented its own experiences by undertaking a number of case studies of initiatives where fodder-related innovation processes seemed to be taking place quite successfully (see case studies below). This provided a historical perspective on the process around fodder technical change and highlighted the non-linearity of the innovation process and the range and diversity of innovations — technical, institutional and policy — required to make interventions achieve their desired social and economic impacts. Of equal importance were the insights into the operational implications for new projects that these case studies provided.

The next section provides case studies both from the Phase I experience and from the wider set of studies that the project commissioned

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<sup>9</sup> The project team and its documentation used the term *partner* to describe its relationship with those it worked with. In reality these relationships varied: some resembled partnerships while others were, at best, organisations sub-contracted to undertake specific project components (authors' observations of Phase I project meetings). The description of the Phase I activities in this paper continues to use the term "partner", recognising this caveat.

## Case Studies

### Case study 1: Strategies of international agricultural research organisations in promoting dual-purpose crop varieties:<sup>10</sup>

#### Part 1: Identifying systems failures

This case describes a project component on promotion of improved crop varieties and the eventual realisation that this is a task that goes beyond technology transfer.

In India, this project component was led by ICRISAT, an international research institute with a mandate for crop improvement. Having a large number of successful, developed varieties of groundnut, ICRISAT was keen to engage in the project as a way of finding uptake mechanisms for its groundnut varieties. To this end, it began farmer participatory varietal selection trials in the major groundnut producing area of Ananthapur in the Indian state of Andhra Pradesh.

Farmers selected a variety of groundnut (ICGV 91114) that provided increased yields of both grain and fodder. However, spread of the technology from on-farm trials was not immediate despite the project's initial promotion of the varieties. This was partly due to the insufficient quantities of seed available. Although it was technically feasible for farmers to use saved seed to facilitate scaling-out, in practice their cash flow needs and difficulties of seed storage meant that the entire crop was sold shortly after harvest and new seed purchased each season. Although private sector merchants were present, they did not trade in groundnut seed because they were priced out of the market by government provision of subsidised seed.

However, even the subsidised government seed system was not helpful in getting preferred varieties to farmers. The routine practice with the government seed supply system was to make decisions on variety and quantity at the state or national level. As a result, the government seed did not match with the choice made by farmers in the participatory trials in Ananthapur.

At the other end of the value chain, traders could not provide an assured market of new seed unless their clients, the oil millers, were confident the supply would be adequate to justify technical and operational modifications to the oil extraction process. While dealing with these wider systems issues was beyond the scope of the project and the mandate of the lead partner in this component, it did alert the project leaders to the need to address these wider linkage and institutional issues. It also highlighted the fact that participatory farmer selection of varieties is insufficient to stimulate innovation; they might know what varieties they want, but getting those varieties and using them is a totally different matter.

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<sup>10</sup> Source: Adapted from Prasad et al., (2006), Bezkorowajnyj et al., (2006a), Bezkorowajnyj et al., (2006b)

## **Part II: Addressing systems failures**

Very much like the case of groundnuts in India, the focus in the equivalent component of the project in Nigeria — led by international agricultural research organisation IITA — was on introducing dual-purpose varieties; this time, of cowpea. While some of the contextual features of the seed system in India and Nigeria were different, similar conclusions were reached. Farmers liked the new, dual-purpose cowpea varieties introduced by the project. However, while government extension staff was aware of the high demand for the seed varieties, there were inadequate mechanisms for articulating that demand to seed suppliers.

Extension agents, and NGOs partnering with the project, looked to the researchers to provide new seed each year, but inevitably its capacity was limited. The project initiated meetings to bring private seed suppliers and extension workers together to discuss ways in which the supply issue could be addressed. However, suppliers were still not prepared to invest money in a new variety for which the demand was not proven.

Therefore, project leaders decided to initiate a new activity. Rather than continue to supply seed to partners, an agreement was made with a private company that the project would underwrite 50% of any losses resulting from poor sales of new seed they produced. This provided the incentive required for the seed company to take a risk and produce seed of the new variety for sale in the following season.

By intervening in such a way, the project helped build the capacity of the seed system by ensuring that a key actor — in this case the private sector — played a critical role in making technology available to farmers. The project thus illustrated the importance of facilitating others to become part of a system for putting knowledge and technology into use.

### **Case study 2: Strategies of a dairy cooperative: Institutional changes to make technology accessible to the poor<sup>11</sup>**

This project component was led by the National Dairy Development Board (NDDB) and the associated Dairy Cooperative Societies (DCS) in the Ananthapur district of the Indian state of Andhra Pradesh. It illustrates the way that institutional changes are as important as technological changes in bringing about innovations in livestock fodder practices relevant to poor people.

As a cooperative, NDDB is focused on the needs of member farmers, although these are not necessarily the poorest in the community. The project took advantage of NDDB's networks and the trust associated with these, and helped introduce institutional innovations that made NDDB a technology-supply mechanism with an increased focus on the poor.

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<sup>11</sup> Source: Adapted from Prasad et al., (2007), Bezkorowajnyj et al., (2006b)

NDDDB has a well established seed production and distribution system. It always hoped that this would act as a mechanism to disseminate new varieties of fodder. The project provided new materials for testing (hybrid Napier varieties for irrigated conditions and *Stylosanthes spp.* for rainfed areas), and uptake was then tracked. Seed was sold through the Dairy Cooperative Societies (DCS) and cuttings of Napier hybrids were provided free to farmers on the understanding that once plots were established they would pass on material to neighbouring farmers.

Project leaders held meetings with NDDDB representatives and technical staff from the milk unions responsible for fodder delivery. This helped facilitate a discussion among farmers and others about the relative merits of the new fodder varieties. It also allowed a discussion of other second order problems that needed to be dealt with in order to facilitate the wider use of the new varieties and of suggestions of other possible interventions that could address the problems encountered.

One issue raised was the poor adoption rates — despite the efforts of union staff to promote the new varieties. This was initially seen as a result of farmers' lack of knowledge. However, discussions revealed that because of the diversity of both agricultural production contexts and household needs of livestock keepers, the introduced materials were not always appropriate. The NDDDB officials and milk unions' fodder extension officers began to realise that a new approach was needed. The institutional innovation that emerged from this included a greater emphasis on understanding local farmers' needs and the provision of a basket of options rather than the promotion of materials identified as promising by NDDDB headquarters or the project.

It also became apparent that some of the most interesting changes that increased farmers' access to feed and fodder centred on the development of another non-technical change. It was noticed that the provision of Napier grass to farmers with access to irrigation initially excluded landless farmers for obvious reasons. However, as livestock is often an important livelihood strategy for poor, landless households as well, these farmers started to develop new arrangements whereby they leased small plots of land from landowning households. Landowners provided planting material and access to water, while the landless livestock-owning households provided fertiliser (manure) and undertook production and harvesting of the Napier grass.

Notable about this case is not just that the poor could access new seed varieties that suited their needs, but also the fact that the project was able to strengthen the capacity of the existing arrangement to respond to the needs of the poor — i.e., the changes to NDDDB strategies. While institutional innovations created this new capacity, its outcome was technological change in the animal feeding system: the adoption of new fodder types by different wealth categories of farmers.

### **Case study 3. Institutional learning: Investing in studying the missing links in the Phase I project.<sup>12</sup>**

This case study illustrates efforts to reveal the wider set of players that were actually relevant to the sorts of fodder-related changes that the project was trying to stimulate. The case shows the importance of investing in the investigation of the wider context in which technological change is taking place, and using this information to adapt the project approach both in terms of what sort of organisations to work with as well as the sorts of relationships needed to engage productively with these different players.

The Phase I project commissioned a study on the range of players related to the co-operative dairy sub-sector and their interactions in the Krishna and Guntur Districts of Andhra Pradesh, India — an area where the project was working with NDDDB as a partner, evaluating different kinds of fodder in 15 villages. The study used an actor-linkage matrix to understand the nature and strength of linkages among the various actors.

The major findings are as follows:

Although a number of actors are present, strong linkages exist only among the ILRI staff involved in the project, NDDDB staff directly employed in the project, fodder officers of the Krishna and Guntur Milk Unions, and participating livestock farmers selected by the project in target villages.

While these linkages are not surprising, the study concluded that there were a number of potentially critical actors present in the area that the project should have partnered with. For example, employment programmes implemented through the District Rural Development Agency (DRDA), and Zilla Parishad (ZP) Block *panchayats* (local administrative structures) could have been utilised for the promotion of fodder technologies. These organisations would have brought with them a strong poverty focus. Similarly, women's self help groups (found in most villages) could have been harnessed for testing, evaluating and promoting fodder as an enterprise. Private sector seed companies, dairy cooperatives and milk vendors were also identified as important players in the sub-sector with a role to play in fodder technical change. But the project had not explored the roles of these players, nor were they included in fodder interventions.

The study concluded that the project would be more effective if it spent more time and resources on developing relationships with a range of sector-related players at the district level. The project's efforts to reveal these shortcomings is also notable (and laudable) as it demonstrated a commitment to institutional learning — in this case, how to change the scope of its partnering to improve the effectiveness of the project's intervention strategy.

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<sup>12</sup> Source: From an unpublished consultancy report: Shambu Prasad, C. and Rasheed, Sulaiman V. (2004) An Actor Linkage Analysis of Patterns of Interaction in Krishna and Guntur Co-operative Dairy Sub-Sector. Centre for Research on Innovation and Science Policy (CRISP).

Our final two case studies illustrate what fodder innovation looks like in practice. These are presented here with the specific purpose of trying to draw out some implications for how to structure interventions to deal with fodder innovation.

### **What would a project exploring fodder innovation look like?**

#### **Case study 4. Navigating the quagmire of innovation: Livestock, livelihoods and second generation problem**<sup>13</sup>

This case study documents the way an Indian government rural development project — titled Velegu — having chosen livestock as an entry point, had to deal with a large number of second generation challenges that subsequently arose. After introducing large numbers of high-yielding buffaloes, the effectiveness of the intervention became limited by other issues, including vet services, fodder supply, and credit. Although there was no forward planning to cope with these unforeseen difficulties, the project formed partnerships with different government departments and NGOs in order to access the resources and assistance needed to make high-yielding buffaloes a viable livelihood option.

Velegu is a Government of Andhra Pradesh Project funded by the World Bank and implemented by the Society for Elimination of Rural Poverty (SERP). Field implementation started in 2003 in Adilabad, one of the poorest districts of the state, with the objective of increasing and stabilising incomes of the rural poor through the creation of productive assets. The evolution of interventions was as follows:

***Intervention 1. Provision of animals and dairy infrastructure.*** Velegu provided loans for the introduction of 4,000 high-yielding buffaloes to promote dairy as a livelihood option for poor rural women and invested in the installation of seven Bulk Milk Cooling Units (BMCUs).

***Intervention 2. Partnering for technical support.*** Relations between Velegu and the government Animal Husbandry Department (AHD) — responsible for government livestock projects and technical support — got off to a bad start. Velegu went ahead and selected buffalo types without consulting the AHD about what it recommended as suitable for the area. Later, however, Velegu approached the AHD and was able to make resources available to AHD field staff so that they could provide veterinary services to Velegu's participating households.

***Intervention 3. Provision of fodder.*** Not surprisingly, the introduction of 4,000 high-yielding buffaloes revealed fodder shortages as a major problem. Velegu worked out three different arrangements to obtain fodder – (1) promoting cultivation by individual farmers on 10-15% of their arable land; (2) forming Common Interest Groups of landless farmers and leasing land from big farmers (3) encouraging sale of fodder.

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<sup>13</sup> Source: Adapted from an unpublished consultancy report by Mona Dhamankar, Centre for Research on Innovation and Science Policy, 2005.



***Intervention 4. Working capital credits.*** In most cases, the purchased buffalo was the first or only animal owned by the household participating in the project. This resulted in a breeding gap and declining milk procurement — buffaloes produce milk only after they have calved. Velegu could not advance a second loan for a second animal, so almost 70% of the programme households approached BASIX — a micro-finance company — for second animal loans.

***Intervention 5. Connecting farmers to the dairy market through partnerships.*** Part of Velegu’s strategy was to try to revive dairy activity as an additional livelihood opportunity for poor households. It was doing this in the traditional way that a development project would do this — paying attention to participating households’ needs, but (perhaps paradoxically) paying less attention to commercial viability. Village Milk Societies were created to cover producers across 3-4 districts. Dairy managers were contracted by the government DRDA at each Bulk Cooler location and officers were appointed to collect and procure milk, test it and make payments regularly. To address the breeding gap, the dairy approached the JK Trust (a private foundation) as well as BAIF (a large livestock-focused NGO). JK Trust proposed lower milk quality and quantity targets, and as a result, was not approved by the then District Collector (the chief public administrator for the district and ultimately responsible for the implementation of government programmes like Velegu). This decision, however, has led to a serious drop in milk procurement, accompanied by the risk of losing the faith of producers associated with the programme. To address this, Velegu invited NDDDB to provide technical expertise to train supervisors and help set up input delivery and related support systems needed for increasing the procurement.

#### **How did innovation take place in this case?**

***Partnerships.*** The Adilabad Velegu Project depended upon several partnerships within and outside the government in order to bring about innovations in livestock practice. A key partner was the Animal Husbandry Department, despite a rather shaky start. Partners such as BASIX were sought to bring new resources — credit, in this case. Inviting NDDDB to set up procurement systems and train supervisors and testers has been a way of both tackling procurement as well as raising Velegu’s credibility in the case of dairy enterprise management. These partners have often had different working styles and Velegu has had to accommodate this in order to achieve its goals and overcome emerging challenges.

***Impact of the political context.*** When the project was initiated, the State Government in place at the time used it as an election tool towards the end of its term. A new government took over and continued implementation of the programme under a different name. However, because the earlier government representatives (now part of the Opposition) told project participants that they need not repay their loans, low recovery rates have emerged as a new challenge. This, in turn, is preventing the establishment of further support services and activities.

#### **New challenges, new partners**

The project initiated dairy activities by providing loans for high-yielding animals. Upgraded animals needed better management, i.e., regular healthcare, better/ more nutritive feeding, and also a more reliable market linkage. This led to collaborative

arrangements with the AHD for veterinary services, the district administration to permit use of revenue wastelands, and NDDDB to streamline dairy operations in the eight locations Velegu was implemented. It is, therefore, evident that one action (the initial loan programme for participants: the first buffalo) led to a whole series of new problems. The evolving nature of problems generated a new set of partners — vet services, credit, etc. Simultaneously, there was a parallel need to make linkages to organise producers, make services and inputs available and to market the milk. Velegu teams coordinated the inputs of the various agencies involved. The anchoring role played by the project facilitated convergence between the programmes of different partners and the project.

### **Implications**

After a number of years in the doldrums the project is starting to show some success. The case illustrates just how messy the process of livestock innovation can be. The implication of this is not just that partnership can be an essential strategy for coping with an evolving set of problems — although it has been central in moving this example forward. More importantly, the case suggests that ways of bringing about innovation need to be approached experimentally in each location. Velegu really is a story of trial and error and muddling through. Developing principles about how to structure this process of trial and error and finding ways of speeding it up could make a valuable contribution to livestock-related problems such as fodder scarcity.

### **Case study 5. Activism and policy innovation: The Andhra Pradesh Grazing and Fodder Forum<sup>14</sup>**

This case documents the way a livestock-focused NGO — The Andhra Pradesh Grazing and Fodder Forum (ANTHRA) — identified a critical policy constraint affecting poor peoples' access to fodder and how they went about bringing about the policy innovation needed to resolve fodder scarcity. It is easy to forget that policy change is a key innovation, and for this to have the desired outcome it needs to result from a process with the capacity to articulate user needs in policy formulation. The case also illustrates that while emphasis needs to be given to technical and institutional innovations in the sphere of rural development around projects or other interventions at a local level, it needs also to be recognised that policy changes affect the livelihoods of poor people. This case discusses the way networking strategies were used to bring about policy changes in relation to grazing rights that affected poor livestock farmers.

### **The Intervention**

ANTHRA is an NGO working on livestock and peoples' livelihood concerns that took the lead role in creating and coordinating an informal platform to discuss and debate livestock, fodder, grazing and livelihood issues in Andhra Pradesh, India. Representatives from NGOs, farmers' organisations, state government departments of Animal Husbandry, Rural Development, Environment and Forests, Watershed Development, Science and Technology were invited to join. Over a two-year period, ANTHRA convened meetings of groups of these stakeholders to deliberate on issues related to fodder security for

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<sup>14</sup> Source: Adapted from unpublished consultancy report by Mona Dhamankar, Centre for Research on Innovation and Science Policy, 2005

livestock in Andhra Pradesh, and to attempt convergence among micro-level interventions addressing different components of peoples' livelihoods and natural resources. The forum also examined the "Strategy and Vision Document for Agriculture" of the Government of Andhra Pradesh, and the "Strategy Paper on Agriculture and Allied Sectors" made public in January 2000 and January 2001, respectively. ANTHRA published and circulated an analysis of the vision document that examined the implications for poor smallholders, and suggested an alternative vision and strategy for socially and ecologically sustainable livestock development.

### **Responding to the draft grazing policy**

In 2001, the State handed over the responsibility of formulating a Grazing Policy to the Forest Department as a component of the World Bank-funded Andhra Pradesh Community Forestry Project<sup>15</sup>. The draft policy was anti-people in that it imposed severe restrictions on the entry and use of forest resources, including charging grazing fees. It listed all the ill effects of grazing without offering any alternative to the forest dwellers and people depending upon livestock and forests for their survival.

The forum convened a meeting to discuss the Draft Grazing Policy and the concerns raised were widely circulated to farmers and livestock keepers across the state. This meeting drew the attention of the Principal Secretary, Department of Animal Husbandry, Dairy Development & Fisheries, and motivated her to write to the Principal Secretary, Department of Environment, Forests, Science and Technology with a request to withhold finalisation of the policy in consideration of the issues raised by the forum. The Principal Secretary then called a meeting of senior Forest Department officials and forum members where he was apprised of the widespread negative responses of the farmers to the draft policy. The need for formulating a grazing policy aimed at strengthening and protecting peoples' livelihoods within and outside forests was duly emphasised.

As a result, the Forest Department decided to withdraw the draft grazing policy. A government order (GO Rt. No. 78 dtd. 27/02/02) was issued for the formation of a committee consisting of a senior officer from the Forest Department, an Additional Director from AHD and with ANTHRA as a member of the forum. This committee was to interact with all the stakeholders, including local forest-dependant communities, sheep and goat-rearers, line department officials, and NGOs and relevant activist groups from across the state. The forum accepted the Government Order conditional to incorporating the grazing/fodder security policy in forest regions within the larger context of developing a fodder development and management policy for the state. It organised a consultation workshop to work out specific priority issues, strategies and a timeframe for the proposed study. All concerned departments presented their positions and suggested strategies to improve fodder resources. Consequently the policy document was redrafted as the *Fodder Development and Management Policy for Andhra Pradesh*.

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<sup>15</sup> According to the draft policy document, during the negotiations for the finalisation of the AP Forestry Project in 1993, the Government of Andhra Pradesh and the Government of India agreed to formulate and introduce a grazing policy for the State as a condition to World Bank funding.

### **How did innovation take place in this case?**

The AP Grazing and Fodder Platform emerged as an active network of different players, each with a different stake in the question of the forest and grazing policy and each seeking an opportunity to influence policy development. Influencing policy is a tenacious process and each actor, while constantly learning about the other actors' perspectives, priorities and limitations, realised progressively that their roles were part of a larger social endeavour. Identifying and inviting players who had specific knowledge or political consistencies that could affect policies, and recognising that these players need to be brought into a process of redrafting a policy document, is a key feature of the process of bringing about this policy innovation. Indeed, this case is as much about an innovation in the policy process as it about a policy innovation. This underscores the interconnectedness of policy processes and policy change.

The case also reveals the way the roles of players changed to bring about this sort of innovation. The government's policy-making bodies took on a much more consultative role, while unusually, NGOs and activity groups were faced with navigating the complexities of different interest groups in their coalition for policy change. ANTHRA obviously played a special role, acting as a champion and coordinator of a process that clearly would not have happened through the actions of either only the government or the NGO groups involved. ANTHRA was not the only champion. Quite clearly the Principal Secretary, as the seniormost Government bureaucrat involved, played an enormously important role in legitimising the consultations and negotiations that led to policy change.

### **Implications**

In short, what this case shows is the way that innovation — even policy innovation — requires the shepherding of different players, with different resources and knowledge in a coalition around a common purpose as a way of better reflecting user needs in the development process. ANTHRA did not have a plan on how to do this. Its actions were an intuitive response to the situation it found itself in and it muddled through the difficulties of developing an effective policy advocacy coalition. Once again, understanding how to structure and speed up this muddling through would help others tackling similar policy-related fodder constraints that affect poor livestock keepers.

## **4. Lessons and principles from this Phase I project experience**

The experiences of the Phase I project as well as the additional case studies of fodder innovation provide many useful insights to help guide future investigation of fodder innovation. The key lessons and principles are as follows:

### ***Participatory research is useful, but not sufficient for innovation***

At the beginning of the project, participatory research was the state-of-the-art answer to the agricultural innovation conundrum. The groundnut case study 1 showed that even though participatory methods helped identify the varieties most preferred by farmers, this did little to help them actually access this new technology and put it into use in their

fields, since the architecture of seed supply systems was either absent or insensitive to identified priorities.

***Technology delivery and use requires networks of diverse players***

Both the groundnut initiative in India and cowpea initiative in Nigeria in case study 1 demonstrated that for effective technology development, adaptation and delivery, a network of players who function in an articulate way is required. In this case, it involved seed suppliers, extension agents, private seed companies, legislators, oil-seed millers, and market traders. The players may be different for different innovation themes (For example, those associated with co-operative dairying illustrated in case study 2 and 4). Whoever they are, without a cohesive network of linkages, technical change seems to be inhibited and the innovations needed for social and economic impacts do not take place.

***Facilitating wider interactions can stimulate institutional innovations that sharpen impact on poor stakeholders***

Project interventions can inadvertently put in place arrangements that either do not work or that work in ways that ignore the concerns of certain social groups — usually the poor. Case study 2 illustrates the way two project partners were promoting Napier grass provided by the project, but were doing so in a way that resulted in no uptake. This was mainly because the organisations, both with fairly strong top-down traditions, were not consulting livestock keepers about their preferences and needs. The project facilitated a discussion between these different players. As a result, the project shifted from promoting only one variety to promoting a menu of options. This improved uptake considerably.

***Institutional learning helps improve project strategies***

Unlike many projects, the Phase I project actually invested resources to help itself learn. The project team realised that the original project design was not as effective as it might have been. It then made explicit efforts to document experiences and processes in its own activities — this was the basis for cases 3-5. It commissioned additional studies on the scope of its partnering to see how its strategy could be improved and explored experience beyond the project. These explicit measures helped the project devise ways of improving the way it addressed fodder scarcity. This is a process often referred to as institutional learning (Watts, et al, 2003). This would suggest that projects need to invest in this process and use it for continuous course corrections.

***Different organisations have different agendas, mandates and traditions***

As the different project initiatives started to expand, and the number of partners involved also grew, the different habits and traditions of the organisations came into play. For example, government departments have a top-down way of working, whereas NGOs usually — although not always — are more client-oriented (see the case of the dairy co-operative initiative in case study 2). These different working styles can prevent critical partners working together and interacting productively; there is no point in partnering with an organisation that ignores your ideas and opinions. Changing these styles of working, sometimes referred to as a process of institutional learning or institutional development, can improve the effectiveness of interventions.

### **Shifting from technology transfer to capacity strengthening**

As the different project activities proceeded, it became apparent to the project team that while viable technologies were important, more important still was the creation of a networks of players that could deliver and use the outputs related to those activities. The initiatives led by international agricultural research organisations discussed in case study 1 show the way the project shifted to facilitate linkages in systems in order to deliver the technologies developed by these partners. The dairy co-operative example in case study 2 showed the way it was necessary to get organisations to change the way they worked, both in order to be sensitive to the needs of poor stakeholders and also to allow collaboration to take place between different players. The policy innovation example in case study 5 shows how it was important to develop coalitions for advocacy and change.

All of these actions actually concerned strengthening the capacity of a network of players to access, adapt and use technology and bring about changes in fodder availability and use. This shift — undertaken intuitively by the project — is very important as it signals the fact that the fodder-related innovation process, while requiring technological (and other knowledge) inputs, is actually dependant on capacity changes. And this capacity is not just the technical skills held by particular organisations. Rather, it is a combination of: skills and resources; relationships for collaboration, cohesiveness and communication between different organisations, including farmers in the public and private sectors; the habits, routines and ways of working (the institutions) that shape the pattern of relationships between different organisations and how this shapes the way things are done in relation to technology and innovation.

At the risk of overlabouring this point, the experiences of the phase I project clearly point to the fact that fodder scarcity is not a problem of technological scarcity that can be overcome by technology transfer alone. Rather, it is a problem of innovation capacity scarcity relating to the ability of the many different players, processes and policies associated with livestock sectors to bring about technological, institutional and policy changes in response to changing circumstances. And in this case those changes may be the availability of new fodder technology, changes in animal production systems, changes in degrees of market integration, and with this, changes in demand for quality and price. The implication of this is that the problem of fodder scarcity needs to be addressed from the perspective of investigating shortcomings of existing capacity (in this wide sense) and experimenting with ways of strengthening this capacity. This is precisely what the Phase 2 project will do. The next paper is devoted to locating the empirical findings of the phase I project in the contemporary conceptual debates about innovation and thus providing a guiding framework for investigating empirically the nature of fodder innovation capacity<sup>16</sup> and ways of strengthening it.

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<sup>16</sup> The project documentation uses the term fodder innovation capacity. The authors have some discomfort with this term, as by definition the innovation capacity being investigated relates to the ability to bring about changes in a number of different aspects of the livestock enterprise — and not only fodder — in response to changing contexts. However, for consistency, this paper uses the term fodder innovation capacity, recognising this caveat.

## **Operational lessons**

By way of summary it is worth highlighting some operational lessons from our discussion of Phase 1 of the project.

*Process-driven investigation.* As a number of the cases show, the process of innovation is far from linear, often due to unexpected second generation challenges and opportunities emerging, or with mid-course corrections being required. Case studies discuss this as “muddling through”. To investigate how to strengthen the capacity that underpins this process, a process-driven approach is required. This suggests that an action research approach should be used.

*Principles rather than a capacity blueprint.* The cases discussed suggest that ways of bringing about innovation need to be approached experimentally in different locations and that ways of bringing about institutional change needed for capacity strengthening will also have a very location-specific flavour. This suggests that a project investigating fodder innovation capacity should seek to develop principles rather than formulaic blueprints. Operationally, this means that the research design will need a strong comparative element so that generic principles can be drawn from contrasting experiences and cases.

*Wider scope of partnership.* The Phase I project concentrated on a relatively limited number of partners in each intervention domain. The evidence of the study reported in case study 3 suggests that this needs to be expanded. Operationally, this means that the new project should concentrate on facilitating the emergence of clusters of partners around perhaps a nodal partner in each location with an explicit responsibility for coordinating the involvement of linkages. The experience of the early project suggests that identifying champions who are willing to experiment with the new approach will be critical. See, for example, the role of NDDB in case study 2 or ANTHRA in case study 5.

*Building partnership skills.* Since partnership is a central part of the approach, the project will need to invest in building up the partnering skills of those it works with. However, like charity, this process should start at home with the project team. For example, the project development process, conducted without consultation of those it seeks to work with, leaves a lot to be desired in terms of working in a genuine partnership mode.

*Engaging with the policy process.* The Phase I project made no attempt to bring about policy changes that might lead to scaling up of its efforts. The example of ANTHRA’s platform for policy advocacy (see case study 5) suggests that not only is policy innovation important, but also that the way of engaging the policy process is to build platforms with wide participation from both the fields of policy and practice. This means that a project on fodder innovation needs to be wide enough in scope to deal with both the enabling environment that may be impeding fodder innovation in specific contexts and locations, as well as the processes that come up with these policies.

## 5. Conclusion

This paper demonstrates that despite the fact that research-led technology transfer has largely failed to address the fodder scarcity issue, there is a wealth of empirical experiences that are pointing ways forward. One of these ways points to the need to revisit fodder scarcity as an issue of fodder innovation capacity scarcity. The second part of this paper will locate that perspective in the conceptual debates on agricultural innovation, and in doing so, will develop a conceptual framework for investigating fodder scarcity from this new perspective. .

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