A Living from Livestock
Pro-Poor Livestock Policy Initiative

Dairy Development Programs in Andhra Pradesh, India: Impacts and Risks for Small-scale Dairy Farms

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EXECUTIVE SUMMARY

Introduction

Andhra Pradesh is one of the agriculturally most advanced states in India but still has high levels of rural poverty. Mixed crop-livestock farming is the predominant farming system practiced by over 80 percent of rural households in the state. Of the total livestock population, bovines accounted for about 41 percent in 2003 (GoAP, 2004). In the rural economy, milk is one of the most important products of cattle and buffalo enterprises, contributing over 51.5 percent of the value of all livestock output and 1 billion US-$ of value added at constant 1993-94 prices in 2002-03 (GoAP, 2002-03). Other products include manure, fuel, draught power, meat, bones, skins and hides. With landless, marginal and small operational holdings (< 2 hectare land) accounting for nearly 80 percent of the 12.6 million farming households (GoAP, 2004), increasing milk production from these farm types could be an efficient way to improve rural livelihoods.

The main purposes of this study were to:

1. Gain insights into the household /dairy farming economics in Andhra Pradesh,
2. Assess the impact of the main dairy development activities on household income and on the economic competitiveness of typical dairy farms in the state,
3. Evaluate the impacts of the main development activities on the risk profiles of the farms, and
4. Assess the impact of combined dairy development programs on the economic and risk profiles of typical farms in the state.

In order to achieve the above, a methodology to quantify the farm-level impacts of different local dairy development programs, policies, interventions and ideas as seen by local dairy stakeholders (policy makers, farmers, milk processors, NGOs, etc.) was developed. The results are intended to inform the political process to initiate discussion for finding the most efficient dairy development activities.

Methodology

The methodology applied for the economic analysis was developed by the International Farm Comparison Network (IFCN) and utilizes the concept of typical farms. Farm types are determined by regional dairy experts taking into consideration (a) location of the farm, (b) farm size in terms of herd size and (c) the production systems that make important contributions to milk production in the region among other key criteria. Two regions, the highly dense milk production region of Guntur and the less dense of Mahboobnagar districts were selected. From each of the districts, a

first category of farms (small farmers) was chosen to represent the size that is closest to the statistical average (2 and 3 buffaloes) for both districts, respectively. As customary in IFCN, larger and smaller farm types were selected to evaluate the potential for economies of scale effects and other predominant production systems in the regions. Therefore, the selected farms include landless, grazing and stall-feeding production systems consisting of local and/or crossbred cows and buffaloes. Management levels on the typical farms are average to slightly above average compared to other farms of the same type. Data is collected using a standard questionnaire.

The calculations are based on the computer simulation model, TIPI-CAL (Technology Impact and Policy Impact Calculations) version 4.0. This version has been developed in the years 2005-2006 to better represent the complexity of small scale dairy farming and to capture the various risks faced by dairy farmers.

This is the first 'dairy development policy evaluation study' done within the IFCN Dairy Research Network. Although great efforts were made both to include all major dairy development programs and to model their economic, social and biological complexities, the authors invite readers' comments on the plausibility of the development pathways and their results and welcome suggestions for improvements of the research methodology utilized (Please contact Otto Garcia at: otto.garcia@ifcndairy.org).

Trends of Milk Production in India and Andhra Pradesh

India produced about 92 million tons of milk in 2004, accounting for 15 percent of total world milk production. Average milk yield in India, at 800 kg per dairy animal per year have been increasing steadily between 1996 and 2003 at an average annual rate of 3.8 percent.

Andhra Pradesh (AP) accounts for 8.4 percent of the national dairy animal population and produces 7.6 percent of the country's milk. Andhra Pradesh's milk production comes mostly from farms of less than 2 hectares with 1 to 4 dairy animals. The milk yields in Andhra Pradesh are slightly higher than the Indian average and are increasing at a faster rate. Farm gate milk prices, however, are slightly lower than the average for India.

Results: Comparison of 'Typical Dairy Farms' in Andhra Pradesh

Based on dairy development and agro-climatic features, the state of Andhra Pradesh can be classified into two zones, progressive and lagging. Following the IFCN methodology, in the progressive Guntur district three farm types GR-1, GR-2 and GR-11 were identified as 'typical'. In the lagging Mahboobnagar district another three farm types, MN-1, MN-3, and MN-14 were chosen. These farm types provide a picture of income levels, possible economies of scale and the effect of commercialization.

Household Comparison

Household incomes range from 1,000 to 4,000 US-$ per year. The landless farms in both regions and the medium-sized farm in Mahboobnagar are unable to achieve a daily household income above the 1 US-$ per person mark. In contrast, the small farm in the progressive zone surpasses (GR-2) exceeds the 1 US-$/capita/day income level, which is mainly due to higher off-farm income.

Comparison of the Dairy Enterprise - Costs of Milk Production

Farmers in both regions receive total returns from 18 to 27 US-$ per 100 kg ECM milk produced (includes cash and non-cash quantifiable benefits). They, however incur total costs of 16 to 38 US-$, when family labour, imputed at local wage rate, is included. This means that only the largest farms in both regions make an entrepreneurial profit. On the other hand, if family labour is excluded from the calculation, all farms make a dairy income of 5 to 10 US-$ per 100 kg ECM. This income from dairy production is relatively higher in the less dense milk production region, which explains the trend of a faster growing buffalo population in MN-3 like households in Mahboobnagar as compared to Guntur. These returns to dairy production (from cash and non-cash benefits) and the lack of better alternative uses of their production factors are the main reasons for these small farms to keep operating.

Results: Assessment of Dairy Development Programs in Mahboobnagar

Mahboobnagar represents a fairly typical dairy situation, in which larger farms (like MN-14) are very competitive milk producers while the vast majority of smaller farms (like MN-3) are economically unattractive and would be expected to significantly decrease in number as soon as these households have better alternatives. This critical situation of small-scale farms persists in spite of numerous dairy development activities long in existence in the region. Therefore, this study assesses the farm-level impact of over 40 potential dairy development programs, activities and farmers' ideas in Mahboobnagar for farm type MN-3. Finally, several of these programs and ideas are combined to assess the feasibility of bringing MN-3's dairy competitiveness level up to that of the larger farms in the region. The results of the program assessments are summarized in the following four pages.

Impacts on Household Income

Current situation: The MN-3 household currently achieves a total income of 0.80 US-$ per capita per day. The dairy activities contribute 0.13 US-$ or 16 percent to the daily per capita household income. With this per capita income, this household can afford considerably low living standards, which has no yet set benchmark under Indian conditions.

Dairy development program impacts: The analysed dairy development programs have the potential to increase the per capita household income by up to 27 percent above its current situation.

Four programs would result in a significant income improvement for the household. These are those in which a) the farm produces fodder rather than milk for sale (this scenario assumes a fodder market and more off-farm work), b) the household 'sells' as much family labour as possible on the labour market (a maximum of 2,700 man-hours per year is assumed for this family), c) the three local buffaloes are replaced with two well-managed grade buffaloes, and d) herd size is increased to five grade buffaloes.

Potential improvement for MN-3: Although all of the above programs individually have large impacts on the dairy activities, none of them is able to lift the family to the 1 US-$/person/day line. This is explained by the low share of dairy income (only 16 percent) in the total household income.

Impacts on Dairy Competitiveness on the Local Labour Market

Current situation: The family makes returns of 0.047 US-$ per hour of (man equivalent) labour invested in the dairy as compared to 0.11 US-$ per hour received for off-farm work. However, the family's off-farm employment is limited to 2,700 hours per year and is seasonally bound. The family will therefore maintain its dairy activities unless more attractive employment opportunities arise.

Dairy development program impacts: The programs analysed increase the return to dairy labour by up to 145 percent above the current situation. Seven programs increase the return to labour in the dairy above 0.10 US-$ per hour bringing it close to the local wage rate.

The most promising programs are those where a) the farmer gains access to more fodder from public land, b) he joins the drought-relief cattle camp, and c) he expands his herd to five grade buffaloes which are well-managed. On the other hand, returns to labour decrease when the farmer purchases costly livestock (life) insurance, when he joins a cooperative and receives a lower milk price and when he utilizes distant (public) veterinary services.

Potential improvement for MN-3: Although about every fourth of the programs assessed decrease the dairy return to labour, another fourth of them increase the latter to a level very close to off farm wages for unskilled labour. In other words, the woman and children attending the dairy could earn a 'wage' similar to that of the husband working off-farm.

Impacts on Competitiveness of Milk Production

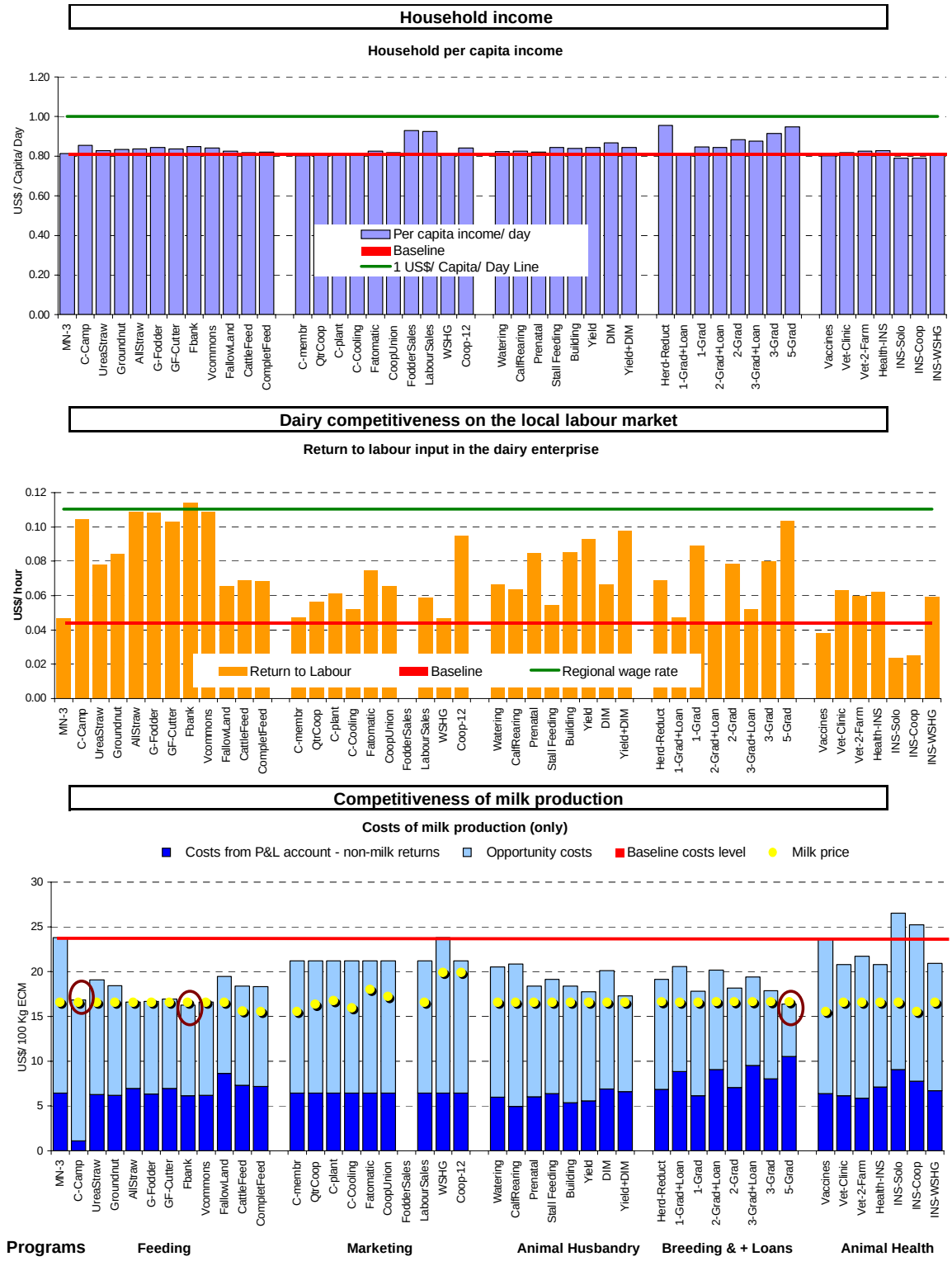
Current situation: The full economic costs of milk production are 24 US-$ per 100 kg ECM milk while the milk price received is only 16.5 US-$.

Dairy development program Impacts: Nearly all programs decrease the costs of producing milk, some by as much as 33 percent.

The programs impacting most positively and also negatively on the dairy farm competitiveness in milk production are the same as those impacting on the dairy return to labour (mentioned previously).

Potential improvement for of MN-3: The programs F-Bank, C-Camp, 5-Grade can bring MN-3's production costs down to 16 US-$ per 100 kg milk, which creates a competitive milk producer both locally and globally.

Dairy development program impact evaluation – Farm MN-3



This assessment of dairy development programs paid particular attention to the risks associated with each of the programs by introducing stochastic elements into the program assessment. The following input variables were made stochastic by introducing probability distributions rather than mean values into the simulations: Milk price, milk yield per cow, livestock prices, mortality rates, prices for purchased feed, crop yield and prices, and wage rate of hired labour. The assessment therefore also provides estimates of probabilities of the programs leading to specified results.

Risk Profile for Impacts on Household Income

Current situation: Household MN-3 runs a 0.53 risk of achieving a daily per capita income below 0.80 US-$. The chance of achieving an income of 1 US-$ or higher are very slim at 0.01.

Dairy development program impacts: Some of the assessed dairy programs have the potential to more than double the probability of the household to achieve a per capita income of at least 0.80 US-$ and they increase MN-3's chances to make an income above 1 US-$/capita/day from 0.01 up to 0.30.

Ranking of the programs: The most promising programs are those in which the farmer improves the dairy genetics and steps up the husbandry practices/management. Purchasing costly livestock life insurance for local buffaloes decreases the chances of reaching the current per capita income.

Risk Profile for Impacts on Dairy Competitiveness on the Local Labour Market

Current situation: The family currently has 0.45 risk of its dairy labour return to fall below 0.047 US-$/man-equivalent hour while the chance of achieving a dairy return to labour equal to the local wage rate is nil.

Dairy development program impacts: Some of the dairy programs analysed reduce the risk of MN-3 to make a return to labour below the current situation from 0.45 to 0.10. However, four programs increase the risks to MN-3's returns to labour while three other programs virtually do not change the probability of achieving the current returns. Interestingly, five dairy programs increase the probability that MN-3 return to labour surpasses the regional wage level to close to 0.30.

Ranking of the programs: The feeding programs have the highest impact on the risk of falling below the current return to labour, while purchasing livestock insurance for local buffaloes, stall feeding of local buffaloes and receiving a lower milk price, in this case from the cooperative, clearly increase the risk of not achieving MN-3's current return to labour.

Risk Profile for Impacts on Competitiveness of Milk Production

Current situation: The chance that MN-3 brings it cost of milk production down to the milk price level are nil. This means that, when all the used family resources are imputed, this farm type cannot cover its full economic costs.

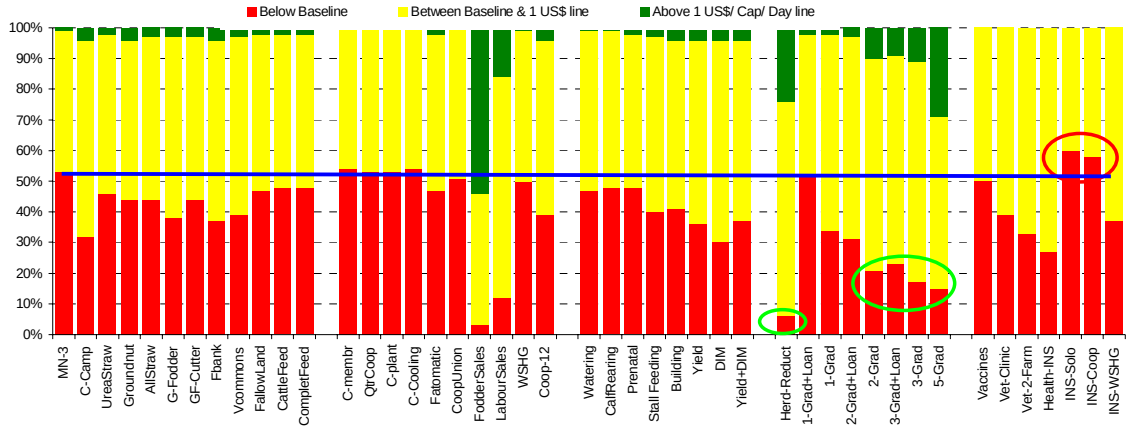
Dairy development program impacts: All but three of the assessed programs increase the probability of MN-3's cost of milk production to be closer to the milk price received. However, the chance to fully cover costs and make an entrepreneurial profit only reaches 0.12 in the best program (5-Grade).

Ranking of the programs: The programs impacting most positively the dairy farm's competitiveness of milk production are first the feeding programs followed by the breeding and herd-expansion programs. Buying livestock life insurance for the local animals, either as a individual or as a cooperative member, do result in any improvement of the probability of achieving more competitive milk production costs.

Risk profiles for impacts of dairy development programs – Farm MN-3

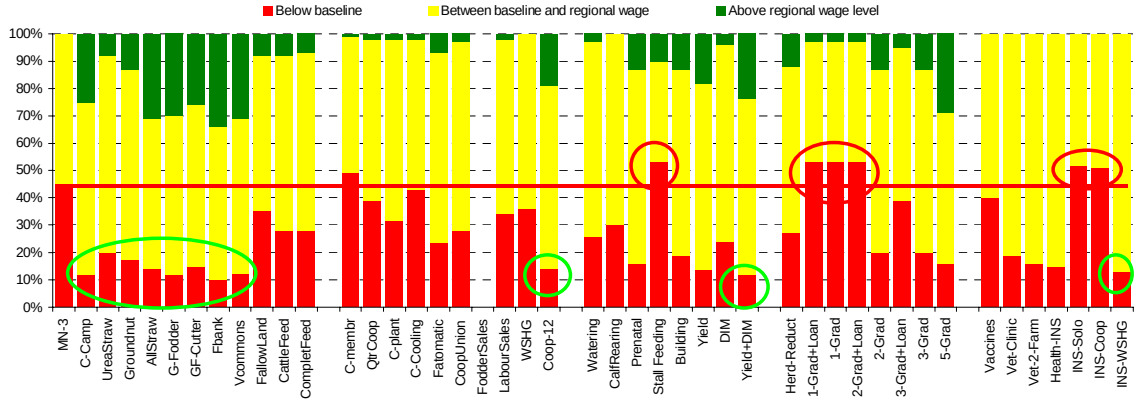
Household income

Probability of household income to be:



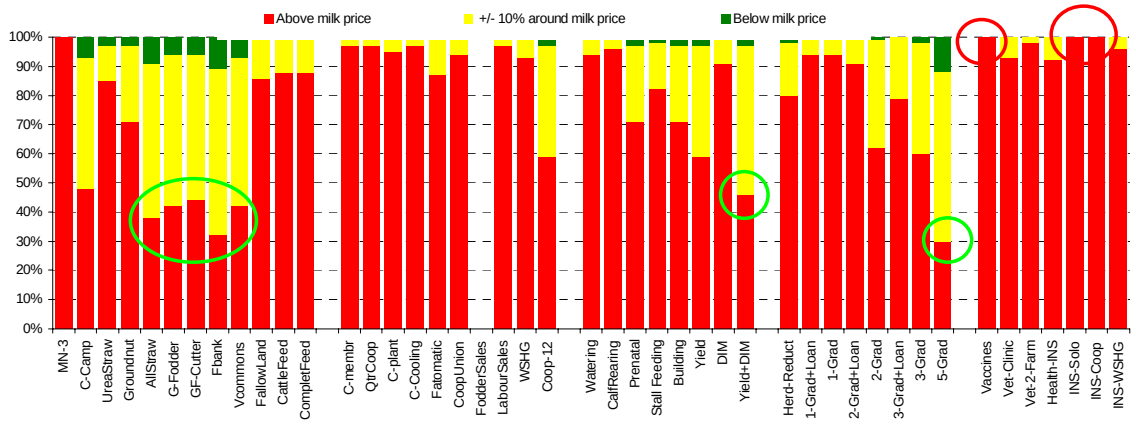
Dairy competitiveness on the local labour market

Probability of return to dairy labour to be:



Competitiveness of milk production

Probability of cost of milk production to be:



Programs **Feeding** **Marketing** **Animal Husbandry** **Breeding & + Loans** **Animal Health**

Conclusion

A chance for dairy development: Milk production in Andhra Pradesh has shown remarkable growth, but the potential role of dairy farming as a tool to increase household incomes, create rural employment and increase the regional competitiveness at producing milk are still to be realized. For dairy to play such a development role, there is an urgent need to provide the vast majority of small-scale dairy farmers with quality livestock services packaged in manners that are affordable and have maximum impacts on the key production and economic factors of their farms.

Feeding programs have high impact: This study shows that feeding programs can have an impressive impact of increasing return to dairy labour by up to 145 percent, thereby surpassing the regional wage level. For the household, this means that any family member staying on the dairy farm would 'earn' a higher wage than the family members working off-farm as unskilled labourers. With such an attractive outcome, why are so few farmers adopting better animal feeding practices? The answer seems to be complex, but this study points to two main factors for farmers' low adoption: higher risk as well as the higher (daily) requirements of working capital.

Risk matters: The provision of livestock services and dairy development programs traditionally has not assessed their impacts on the risk profile of participating farmers, despite it being well-known that resource-poor farmers, being particularly vulnerable, are risk avoiders. They will not participate in a 'promising' program if it increases the risk of the farm to fall below its current performance levels. Subsistence farmers have no economic buffer to compensate for any fall in either production or income. Therefore, the desired development programs must simultaneously increase the farm's economic performance and improve the farm's risk profile.

Farmers, in this study, were not only highly risk averse, but were also reluctant to make positive assumptions such as having more or better access to water, working capital, health services and a more remunerative and reliable milk price. Such assumptions were a prerequisite for running some of the program scenarios. Furthermore, MN-3 and smaller farmers were in wide agreement that without conditions in place to diminish or eliminate their risk in adopting new technologies, they would not join the main programs, in spite of their obvious potential benefits. Their risks were simply too high and they offered investment in grade animals as an example of how they would then have to stop grazing their animals on public land and replace paddy, their main staple food, with green fodder. In addition, they would produce for a very unreliable market (milk vendors) or obtain a non-remunerative milk price (from the cooperative).

A 'Dairy Development Ladder': Dairy development programs in Andhra Pradesh, as anywhere else, are not conceived to address all the (risk) factors, which finally determine the adoption and success of the programs. It is questionable whether it would be practical for any one program to attempt to simultaneously tackle all identified issues and a sensible approach would seem to be to forge strategic partnerships among already existing programs which have strong complementary effects. Reflecting on the farmers' most quoted example, if MN-3 is going to upgrade its animals, it will require a reliable and remunerative milk price, access to affordable high quality health services, animal feed etc. This means that the breeding efforts driven by the Andhra Pradesh Livestock Development Agency (APLDA) must be accompanied by complementary programs.

The need for one program to partner and/or build on another became evident in the 'Dairy Development Ladder' exercise carried out with stakeholders in Mahboobnagar. The results indicate that, effective partnerships (among various programs and with the farming community) can gradually lift MN-3 households out of poverty through developing a competitive dairy farming business, which provides not only an excellent local wage level, but also strengthens their position against international competition in a global economy.

Pro-Poor Livestock Policy Initiative (PPLPI)
Website: http://www.fao.org/ag/pplpi.html
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