Assessing capacity gaps in the livestock sector in Andhra Pradesh, India

Perspectives for collaboration between CRV Holding, Agriterra and A.P Indian farmers organisations

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Theo van den Berg in collaboration with Anil V. Kumar Epur

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chilling centres or to the dairy plant. Farmers get paid every 14 days. There are enormous numbers of privates active who buy milk from the farmers and distribute the milk mostly on motorbikes to their customers. It is a miracle that they can keep up with quality demands in hygiene.

Chittoor: Unknown farmer
Visited a poor farmer in the hills directly neighbouring the above mentioned collecting centre; this farmer owned five cows, four 5-10 litres and one - probably Sahiwal / HF / Yersey - was peaking at 25 litres of milk; he owned (and shared with neighbours) a straw cutter to chop the sorghum. This farmer could handle durable, high yielding cows. He would advise his children to go for other occupations then farmer, although he was doing well in his community.

Visit to the Minister of Agriculture of the Andhra Pradesh
Presentation of CRV HG by DVD-film. Discussing early thoughts after 5 days of visiting about livestock sector in the AP. The meeting was in presence of lots of staff. Spoken about:
- the goals of four folding milk production in 5 years; the role of poor rural farmers in it;
- the major constraint of feed supply and two animals eating more than one producing the double
- identifying animals for dairy development, for genetic programs and disease control.
- goals of this mission of Agriterra and CRV: world community service, seeking for possible cooperation between cooperatives and to gain a better understanding of the dairy livestock sector as prices for milk in Europe are strongly increasing; CRV is strongly aware of the fact that India is influencing the market in Europe, that the market has become global. I am not in India to sell semen.
- that I did not visit so far any breeding evaluation program; that I had only seen some evidence of crossbreeding experiments; that I was hoping to get more knowledge in coming days about field proven genetics available for the farmers.
3. Findings of the identification mission

In this chapter, we respectively treat the following subjects:

- Dairy development
- Dairy development genetically
- Artificial insemination services
- Farmers organisations

3.1 Dairy development

*Milk production in general*

According to FAO reports, in 2001 India became the leading country in the world for milk production with the US second with 84 million metric tons per year. The ‘dairy’ animals (predominantly by buffaloes and cows) produce less then 1000 kgs of milk per year. There are 100 million farmers in India; some 80 million farmers or landless labourers own one or two animals to produce milk. The Andhra Pradesh as a state is ranking 4\textsuperscript{th} in milk production in India. AP produces 8 million metric tons of milk per year.

It is not clear to me whether these statistics refer to the total estimated production by the animals or delivered to the milk collection centres (a part is kept by the farmers and landless labourers for their own needs, or sold to others and not to forget: almost all cows are suckling their calves).

According to the report of Anil in the AP are found now 9.3 million cattle and 10.6 buffaloes of which 8,845 million are breedable and (males and females). The 21st century is considered to be for livestock related industries: the livestock sector has annual growth rates of 4.5% and contributes 23% of agriculture G.P.D..

*Average income of farmers*

As per the 2001 Census, Andhra Pradesh had 76.2 million people. The working population amounted to 34.9 million, of which 7.9 million cultivators (22.5 per cent of the total) and 13.8 million agricultural labourers (39.6 per cent. The net cropped area is around 11 million hectares (2001 data), cultivator population 7.9 million and an estimated net domestic product from agriculture (surplus marketed) of Rs 37,202 million (2001-02). So the net product (marketed) per hectare was Rs 3,382 and per cultivator it was Rs 4,702 (€ 94,-). Daily wages for a labourer nowadays would be € 2,-

*The goals of the government*

The government is stimulating agricultural production (‘green revolution’ and the ‘white (milk) revolution’). AP for instance has set a goal to fourfold increase in 5 years the daily delivered milk of 1.5 lakhs litres to 6 lakhs per day; at the same time the poverty of poor farmers must be relieved by playing an important role to increase milk production.

These goals of the AP-government strongly coincidence with the goal of this mission. As the economy of India is booming, the number of people in India who can afford to buy milk products is increasing rapidly. The same is happening in China. Together India and China inhabit almost half the world population of people. No wonder the world market the prices for milk products are increasing dramatically.
Farms in urban area
Around big cities like Hyderabad one finds the bigger farms for vegetables and fruits, big poultry farms and dairy farms partly landless with some 10-40 buffaloes and cows. Prices of urban area farming land is very high and could bring more than Rs 1,000,000 (€ 20,000) per ha. Around Hyderabad in enormous areas, the farmers have sold their land for real estate projects waiting fallow for building.

Farms in rural area
Small farms and ‘one cow backyard farms’. In rural areas the farms seem to be very small, mostly 1-2 acres and 1-2 dairy animals. (61% of the farms are < 1 ha in India). Also landless labourers do own 1-2 cows; they have to buy feedstuff or go walking for grazing low nutritional feeds. As a thumb rule one acre of green fodder cultivation for every five reasonable yielding animals is required. The poor rural people can buy dairy animals (subsidised 50%) by the government (eg Rs 12,000 in stead of Rs 23,000 for good cow or Buffalo). Prices for these animals on the market vary strongly with milk yields.

The dairy cows are financed by (micro-)loans and obligatory insured against calamities (round Ø 2,5cm cupper ear tags with a number). More than 70% of the cattle numbers in AP will be found in these one cow backyard farms (report of Anil).

Women will take care for the cattle and milk them while the husband is working in the fields or working as a labourer. Most of the milk is still sold to private sellers who go around by motorcycle (2 cans of milk on each side) to distribute to their clients. There are very successful milk sales cooperatives driving upon woman memberships. The Mullkanoor Dairy has more then 30,000 members and can sell easily the double daily milk collections as was stated in other dairy plants and other coops.

Housing and rearing
The animals are always kept tied in a stall, mostly a shed or tied outside. In farms with bigger numbers of dairy cattle the animals will be kept in stalls for day and night. When a cow is high yielding farmers keep these cows in stalls because of the risks when grazing. In villages the one cow backyard farmers sometimes join forces: during day time their buffaloes (I haven't seen groups of cows) are reared together on 'grazing fields' near water places by eg a elderly couple. The manure collected during the day is part of the compensation for their rearing work. Milking is done by women in the 'one cow backyard farms', whereas labourers are hired as milkers in dairies with more then 10 cows.

Interesting info as obtained by meetings and conversations
- Cows are not supposed to be slaughtered by law (and are considered Holy). This was merely because of their usefulness: milk, calves, draught power, manure for the land and fuel for cooking. Officially a cow is allowed to be slaughtered if diseased (veterinary certificate needed). Bulls and buffaloes can be slaughtered.
- Rain: a good year brought the last years 600mm of rain, whereas the average rainfall >30 years ago would be 700-900mm's.
- Long before the decolonisation in India (1945-1947) enormous numbers of small size irrigation systems in numbers and in extend were developed by the villagers and the kings but during the following decades dramatically neglected. The last decade the Indian and local government is restoring, improving and extending these irrigation systems. In addition large scale irrigation systems have been established in many areas.
- Although the APLDA introduced animal health programs and vaccination is stimulated on farm levels, the animal health situation is big trouble: an outbreak of FMD was there; animals with brucella are on the market (was told); mastitis is very common. As in every developing nation the movements of people, animals and goods has steadily increased and creates big vectors for spreading diseases.
• Sustainable in India is primarily meant as health, enough to eat and safety as their ecological footprint is very small, whereas Europeans mean energy-efficiency, biodiversity and CO2-management.
• Cotton production has revived in a few years after introducing the genetically modified cottonseeds (>80% now) where far less insecticides are needed and yield is high.
• Government sets the minimum prices to be paid to farmers for a few crops, like sugarcane, rice, wheat, etc.

Milk production and dairy development
• Basic: Evidence for the increasing demand for milk was felt all the way through this mission: meeting with farmers and farmers wives, visiting milk collection centres, milk chilling centres, dairy factories, farmer cooperative organisations, governmental and nongovernmental organisations and of course the government of agriculture in the AP.
• Starting milk production appears to improve the livelihoods of the poor farmers, especially the poor and mostly landless labourers and former tribals. It is believed that the majority of these poor families could survive the droughts of the last years just by milking one or two cows. Until recently the farmers and landless labourers were producing merely for sustenance of their family; nowadays they sell milk on a regular basis which brings them a market based income.
• Numbers of collection centres and chilling centres are rapidly increasing; stimulated by cooperatives and other NGO’s.
• There is no uniform identification system for all cattle. Mostly there is no control of identification of animals at all beyond the farm gates. If this holds through, it will severely impair dairy development, disease control, etc. for the future. Note: An ear tag is obliged for insurance in case animals were bought by poor farmers with loans subsidised by the government (12,000 Rp for a heifer against 23,000 Rp on the market).
• The milking animals have helped the rural areas to survive the droughts from recent years.
• The government has set goals: milk production in AP must increase fourfold in five years and poor farmers must profit from the programs to increase milk deliveries (production?) to collection centres (in the AP 1,5 lakhs ltrs of milk a day last year; in 2011 6 lakhs milk a day).
• The government is helping the poor farmers by subsidised purchase of dairy animals, subsidised health care, fertility (AI and hormonal treatments), concentrates and minerals. Control on deliveries of subsidised means to the right places is difficult (think of illiteracy); control of registrations is difficult.
• Poor farmers profit from these programs, however in cases where the farmer can’t pay the rents, there is a high rate of suicides among these farmers (1000 registered suicides in AP last 2006 according to FFA information). However in other areas with no dairying the number of suicides is said to be higher. The cause for suicides are many though.
• Women are milking and taking care of the cows while the farmer is working on his land or bringing in some money by daily wages
• Women’s dairy cooperation’s are very successful; Mulkanoor can process raw milk and market milk products in far greater quantities than 30,000 women farmers are bringing in. Stimulated by the cooperatives and of course by the money these farmers keep their heifer calves for future expansion. Leading management thinks that better genetics would be feasible and help them a lot to increase supply of milk to their plants. Mr Laxma (general manager) would greatly appreciate the availability of semen from genetically superior bulls on milk yield for the farmers.
• Although farmers complain about the ‘low’ prices they receive for their milk (cow milk 9 Rp’s per litre (3.5%F); buffalo milk mostly 15Rp’s (6%F)); they also complain of the extra feed costs for higher yielding animals and the higher
veterinary costs. Nevertheless, especially women say they want more milk per cow and they want more cows.

- There is no question that all these programs can help poor farmers, results are seen, however the efficiency is questionable, produced statistics are not well verifiable or not verifiable at all.
- Green fodder is often only available in and for a short time after the monsoon (monsoon periods can vary between areas); in dry periods mostly inferior or low nutritional food is available: dry grazing fields and bushes and stocks of crop residues and hay which has lost much of its nutritional value.
- Functions of cattle and buffaloes have changed in time: more and more tractors of contractors are being hired, so bullocks are less and less needed for labour. Bull calves are mostly unwanted and not taken care off, where female calves are well cared for: mostly several to 10 months suckling her dam.
- Rearing bullocks only for ploughing is very inefficient, costly and time consuming (just a short time each year); for transports even on short distances, it takes a lot of time for the farmer. Hiring tractors is becoming popular.
- I have no specialised schooling seen for children who want to become farmers, they learn from their parents, from the farmers cooperatives and from extension work by NGO’s.
- Milk handling: It is almost unbelievable that under the conditions I have seen milking, collecting and chilling just a very low %-age of the milk becomes sour as read by statistics. I have seen 30-40 it cans at a chilling centre of IMF after washing standing in the full sun and carrying 0,5 to 1,0 ltrs of a possibly chlorous or other watery fluid. Improve milking hygiene, hygiene of milk containers, shorten time between milking and chilling. The filtering of the milk at the collection centres needs more attention.
- Lots of lakes and irrigation canals build during the past over 1000 years are neglected. Areas with well managed water and irrigation are doing very well. The government has picked up now enormous projects to restore irrigation capacity in several areas.

3.2 Dairy development genetically

Most cattle I have seen are either a non descript local breed, crossbreed with Yersey, Holstein Friesian, Red Dane, Brown Swiss and Ayrshire. Original cow breeds are mostly Sahiwal, Red Sindhi, Gir, Haryana, Buffalo and Murrah (higher milk yielding Buffalo breed) for milk and off course the Ongole (Nellore) for bullocks.

Apparently imports of exogenous breeds has been done. Momentarily imports of frozen semen to India is currently not allowed by the Government of India. While the milk production of India is below the actual demand, GOI as I understand has finalised a protocol for import of semen, embryos and live animals from different countries. Lately, in the AP there seems to have been imports of live cattle and semen from Australia as found on internet.
### Cows vs. Buffaloes

<table>
<thead>
<tr>
<th>Cows</th>
<th>Buffaloes</th>
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<tbody>
<tr>
<td>Higher in milk yield than buffaloes</td>
<td>A good breed is Murrah; the original local breeds mostly are very low in milk yield</td>
</tr>
<tr>
<td>First calving age from 24 months (avg 27)</td>
<td>First calving age from 36 month (avg 42)</td>
</tr>
<tr>
<td>One calf every 12-14 months; market for bull calves very low</td>
<td>One calf every 18 months; no market for male calves</td>
</tr>
<tr>
<td>Fat: 3.5% (increased demands by middle class health conscious families and by hospitals)</td>
<td>Fat: 6-7% (for butter, making tea and for drinking)</td>
</tr>
<tr>
<td>Crossbreds with HF and Yersey are well adapted to the Indian climate</td>
<td>Lower feed costs while maintaining them with more fibrous crop residues; so it is a poor farmers cow who is paying not to much attention. They will survive on very poor diet while not producing milk</td>
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<tr>
<td>Docile animals, easy to handle.</td>
<td>Need more cooling, especially when productive</td>
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### Findings
- Buffaloes bring very low lifetime production: low yields, 1st calving at more then three years of age, low fertility and between calving time is equal or longer then 1.5 year.
- Farmers find buffalo bringing a high milk price (6-8% fat), however their production is low.
- Mixing of high and low fat milk is common by farmers.
- Farmers find buffalo an easy handling animal, also they think these animals are better resistant to diseases. I have seen two farms with FMD, both with Buffaloes.
- Most buffaloes are local breeds and low in production. There is a Buffalo breed named Murrah which have curved horns and are bred for higher milk yields. The local breeds have mostly long backwards directed horns
- Old farmers tell about the hughes numbers of cows in the past in the AP; today the buffalo seem to be dominating in numbers (although official numbers state equal numbers). May be because cows are mostly kept in stall during day time.
- Farmers are extreme cautious when they have a cow producing 25 lts milk a day (which is very exceptional); they are not aware that high producing animals simply need more care especially feed management.
- Lots of the buffaloes and cows are of an undefined, non descript breed.

### Genetic evaluation
- There are no genetic evaluation reports on individual female dairy animals (buffaloes and cows) when buying them; just what the vendor says about production; so these animals are bought on what they look like (phenotype).
- Since 1990 there is genetic evaluation program by APLDA executed within India; I have been told and showed some evidence about a program with progeny testing: since 1992 in total 60 bulls (Sahiwal x Yersey) were tested and the bests are made available. Under the given conditions it is a quite an achievement to have some proven bulls.
- A genetic field progeny testing program is going on and guided by Dr Ravi Kumar: at this moment a batch of 15 test bulls is in progress; 2000 insemination per bull; MPR 1st between 10-12 days p.p., followed by sampling once a month; 11 months recording; 305 days lactation yields.
- In comparison with other crossbreeds this Sahiwal*Yersey crossbreed would have been the best suited for Indian circumstances. I have seen no evidence for this. Before Sahiwal x HF bulls have been progeny tested in the same way. I have met a milk controller and seen her registrations; she typically samples (F and SNF) and follows 50 progeny. The raw data would be processed at some university in Hyderabad where least squares and BLUP is used to rank the bulls corrected for:
1. local institute or village
2. season of calving
3. sex of calf
4. year of calving (age)

Also bodyweight of calves is registered and evaluated per bull. One person (milk sampler) is responsible for 50 milking cows; a sample for F and SNF is taken. From the progeny young bull calves are selected for the next generation. A farmer would get Rs 6000- Rs7000 for the calf.

I have learned under the infrastructural conditions for cattle improvement in the AP, to respect the managing of field evaluation test programs; it takes enormous efforts to succeed even with the small size of the program I have witnessed. I have seen very dedicated people working in this field. However, with this small size sampling programs, these long generation intervals between sampling generations and the limited number of treats and conditions evaluated and corrected for, the genetic improvement is far from maximum.

- There seems to be no awareness that the variation in genetic value within individuals within a breed can be enormous and between means of breeds/crossbreeds may be low.
- As under better managed conditions in India like in the military cow dairy farms, milk yields and fat % are relatively low, it is reasonable to assume that the genetics are not used/available.
- Cows in India seem to be very low in fat % (3.5%); for a part this could be lack of energy intake, however, I have met conditions on some farms where one suspect the genetics to be the main cause, not the feeding.
- Except for crossbreed averages, there seems to be no awareness among farmers about the genetic potential of a well evaluated high ranking bull or cow. Farmers take semen that is advised and merely discussions on choice of the bull are limited to crossbreeding.

### 3.3 Artificial insemination (technique and logistics)

APLDA is the governmental organisation that has launched a massive programme of Restructuring of Breeding Operations in cattle under the scheme: NPCBB. AI must cover the total breed able population at the farmers' doorstep aiming for higher milk yields by better genetics. This scheme must be sustainable (recycling revenue). They channelize all the inputs needed to provide AI. They regulate and ensure all the quality control inputs and services rendered by the field workers.

AI is offered by the APLDA, through Animal Health Centres and other foundations working together with APLDA (see for further details the report of Anil).

I have met with Dr L Mohan, who is in charge of this scheme. Unfortunately I haven't been able to follow the complete logistics of AI during this mission. Although I have visited an Animal Health Centre and witnessed on another place an insemination by a technician, the first impression of technical skills and knowledge of the AI technique seemed of a good quality. The numbers of activities seemed low. However, it is necessary for me to follow the complete logistics around AI in a bigger extent than is done, to see gaps. Under the conditions I have witnessed, it is feasible that Anil is right in mentioning constraints and needs for intervention.

BAIF is a foundation with the support of the AP government. AI is offered (subsidised by the government) to the farmers to make better genetics available for the farmers. BAIF provides AI services for crossbreeding and upgrading the local cattle and buffaloes.

I have visited a BAIF AI-centre in Narmac and spoken with the supervisor of 10 gopalamitras; he was living in Hyderabad. An AI centre is a small building where the
supervisor has his office, his registrations and a LN-tank of 20 litres buffer. This office was donated by a local 'youth club'.

A cluster of 10-15 villages will be serviced by one AI centre with 10 technicians (gopalamitra's). They will service from here with a motorcycle with a holder for his semen tank of 6 litres and his insemination equipment. For Rest 40 an insemination is performed including semen. One gopalamitra services a radius of 10 km 24 hours a day; mostly he will inseminate 1-3 cows/buffaloes per day: 500 inseminations per technician per year would be normal. The same gopalamitra will give further support to the owner of the inseminated animal: pregnancy check (rectal control on 3 months), assistance with birth of the calf if asked for, deworming the calf, instruction on rearing the calf and registration of the calf (not clear to me how). So these gopalamitras will give doorstep service. A gopalamitra will earn Rs 4000 - 5000 per month.

Sandramitrats give first aid at farmers places and if needed call for a veterinarian or gopalamitra. Major concern of the supervisor: training gopalamitrats is costly and often they resign after a short time to have a better paying job. Notice the vicinity of Hyderabad. In this area the investors buying all the land for future estate projects. Only in the Chittoor district I have witnessed an artificial insemination by a technician.

3.4 Relevant organisations

APLDA
APLDA as an instrument of the government of the AP plays the key role in developing the livestock of AP. For further details: see the report of Anil.

JK Trust
Representatives of the JK Trust gave a presentation on the opening meeting of the mission on the 19th of October. They operated 150 ILD centres in 2 districts of the state AP namely Chittoor and Anantapur. The programme in Andhra Pradesh has resulted in production of 1,28,174 upgraded/crossbred calves. After completion of the project period of 5 years these centres were handed over (from November 1, 2005) to Andhra Pradesh Livestock Development Agency for the regular supply of semen and liquid nitrogen. These centres have now become self-sustaining and are running smoothly on their own. JK Trust initiated her activities under Andhra Pradesh Rural Livelihoods Project (APRLP) in Anantapur and Kurnool districts by establishing 35 ILD centres. Twenty ILD centres in Anantapur have become operational during October 2006. Whereas, 15 ILD centres in Kurnool have become operational on 22nd December 2006. I did not meet them later on, nor met activities of them.

IIMF
IIMF by mouth of Mr. Samson has a strong believe in farmers' cooperatives. They concentrate on open minded primi inter pares among the poor and they booked lots of successes with open minded intelligent mostly illiterate women. The organisation is a federation of 20 Mac's (Mutually Aided Cooperative Societies) in 478 villages, 3326 SHGs with 43032 women members. SHGs (Self Help Groups in a village send a delegate to the MACS. Most of them are illiterates, they have learned to appreciate the role of professional staff.

Mr Samson (CEO of IIMF) thinks that the Producers Companies Act 2002 has helped agriculture in India. The government started stimulating dairying by landless labourers and by small scale farmers through subsidising purchasing dairy animals with institutional loans. The MAC's became a success and the goal to have 40,000 members in 2010 is already met. IIMF concentrates on the districts Nizamabad and Adilabad.
In 2002 IIMF starts with a 2 year pilot for milk procurement and marketing. Now 5 bulk milk coolers are installed; the members deliver on an average 1,5lts / day; mostly they own 1 buffalo; mostly they do not use AI (Liquid nitrogen supplies is a major problem in his opinion).

He strongly believes that lots of these one cow backyard farmers would not have survived the last year of drought without that animal. Now IIMF stimulates these farms with cooperative loans. To better the situation of these poor farmers he thinks that better nutrition, better health care and AI (AI to have better genetics available) are prerequisites. A program called DESI is set up. Lots to concentrate upon: e.g. 20% of the foodstuffs is wasted. Mechanisation takes place, although it is very expensive, but changing lifestyle makes it necessary.

FFA-AP
The Federation of Farmers Associations, Andhra Pradesh is a unified, independent, apolitical, grassroots farmer’s organisation with innovative programmes and dynamic action plans to contribute to Agriculture and Rural Development. Agriculture should be a profitable occupation to reassure farmers to restore his dignity and foster social equity”. They claim to represent 3.5 million members which could not be verified with me. This organisation represents organisations from the whole agricultural sector. They are very active in creating awareness about the problems of agriculture in the parliament and government; they work together with other FFA’s in other states; they form networks for farmers commodity interest groups (CIG’s); they train farmers, organise extension programs; they lobby on national level.

I have visit the FFA-AP office in Hyderabad on the first day of my mission and met with the Board and the President Sri P. Chengal Reddy who is also the Secretary General of the CIFA (Consortium of Indian Farmers Organisation). They made statements about why farmers today are angry: they are forgotten group in the economic boom of India; they make very clear statements in “Why Indian farmers are Angry”; among others about the agricultural policy that always looks promising but never is implemented, so they claim. Although they recognise the past efforts of the government.

Interesting: the very promising NGO’s like Christians and other missionaries, Rama Krishna Mission, Father Ferror, Oxfarm, etc. starting 30 years ago hospitals and schools. However nowadays they are living in New Dehli with their huge resources from Europe adopting anti-farmer programs: they love the poverty, they love the animals more then human beings, they love nature more then agriculture, they love the lifestyle of the poor and they oppose mechanisation. They claim the stock answer from the government when demands for subsidies are made: India has 60% farmers as against 6% in developed nations and therefore cannot afford.

BAIF
Providing door step AI and following up services. See report of Anil

CKO
The Confederation of Kisan Organisations (CKO) was established in 2005. Kisan is an Indian word for farmers. CKO has been concentrating on village level activities, facilitating the setting up of farmers and rural women societies, providing them training and advice and facilitating their capacity development. It has on its board leading members of the cooperative movement, progressive farmers, distinguished scientists and educationists as well as well recognized social workers.
4. Conclusions

Although the mission was relative short, a lot of information was collected on cattle improvement and dairy farming. There are a lot of possible constraints and gaps in the livestock sector and I expect lots of them being 'open doors': everybody can tell that rain fall, the water housekeeping and the available arable land are major constraints.

However, it seems important to look at what role farmers’ organisations could play, and what is in the interest of their members. In this respect, there seems to be a lot of scope to explore the link between cattle improvement and increased milk production.

As the most simple imagination of picturing milk production and cattle as a process the following would do:

\[ \text{Inputs} \rightarrow \text{Animals} \rightarrow \text{Milk} \]

This logic indicates that in order to increase milk production, we should focus on improvement of inputs (feed), the animals themselves (genetics) and milk (handling).

1. Improvement of feed quality, feeding and fodder development

A major constraint of the AP (read India) in raising milk production now and in the future will be the availability of price worth animal feedstuffs. One must realise that two cows will eat more then one cow producing the double amount of milk! Only 20% of the total energy intake by the cow is used for milk production. The higher the production the higher the % of the total energy intake is being used for milk production. That is why the best genetics (high milk yield, high fat and high protein in cows which can adapt to Indian conditions) should be available.

Notice that a period of 'under nutrition' will impair the production the rest of a lactation period. By constantly available, basic quality green fodder inputs, starting at the beginning of a lactation, the effects may be dramatic (given that deliveries of just 1 kg milk per day is very common and a high %-age of the total daily deliveries). To the basic daily inputs belongs also constant access to fresh water!

Is there constantly enough basic nutritional feedstuff available for the animals in the AP? NOT on the farm level in the off-season! I do not know whether this is available on the market; most probably not. In the off-season low nutritional fibrous inputs will not do and expensive mineral balanced mix ratio concentrates have to be paid by the farmer in advance, before he might profit (or will not profit because off the lack of knowledge: the input has to be in accordance with yields, the lactation stage, etc.) There does not seem to be adequate awareness that fat %-age is influenced by feeding (and on more long term basis by genetically selected bulls).

2. Improvement of genetics for dairy cattle improvement and artificial insemination services

In my visits I have not seen modern, contemporary superior genetics in cattle. Bull lists of technicains as I have seen, only would show the breed or mostly the crossbreed and the production of the bull dam; no clear genetic values. However, I have seen evidence of progeny test programs, although limited to a very few treats.

Indeed it makes no sense to use superior genetics for milk production in most one cow backyard farms. However I have met farming conditions where superior genetics could be handled very well. I have visited farms with good management where the highest
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peaks in production of one single cow would not exceed 25 litres of milk per day while herd mates would mostly not exceed 10 litres (at the military dairy in Secunderabad one cow peaked at 33 litres).

One must realise that starting to use superior semen genetics today, this farmer will see the first effect after three years. And one must also take into consideration that the effect in a daughter will be just half of what the bull was promising, the other half is determined by the dam on the farm. As the demand on the market for milk is and probably will stay high and the logistics of milk collection will improve, farmers will become more market driven and learn a lot on managing higher yielding cows in three years.

Another effect will be that the existing progeny testing industry of India would be challenged enormously, as soon as superior semen of exogenous origin would become available on the Indian market.

3. Improvement of milk handling and increase of deliveries of milk

Farmers could deliver more milk and have better incomes by weaning the calves early. Although I am aware that under most Indian farm conditions rearing calves apart of the dam and growing them on milk replacers is difficult, the increase of milk deliveries to the market could be dramatic for India.

It almost unbelievable that under the conditions I have seen milking, collecting and chilling just a very low %-age of the milk becomes sour as read by statistics. I have seen 30-40 lt cans at a chilling centre of IIMF after washing standing in the full sun and carrying 0.5 to 1.0 ltrs of a possibly chlorous or other watery fluid. Improve milking hygiene, hygiene of milk containers, shorten time between milking and chilling. The filtering of the milk at the collection centres needs more attention.
5. Recommendations

As indicated in the previous chapters, there seems to be a lot of scope to explore the link between cattle improvement and increased milk production. Increased milk production will have a direct impact on farmers' income, and it seems that farmers' organisations have an important role to play in this area. Therefore, in order to improve cattle and milk production, any support programme for farmers should focus on several interrelated issues:

1. Improvement of feed quality, feeding and fodder development
   - Fodder development and storage for off-seasons
   - Improvement of feed quality and feeding

The focus should be on conserving/silaging of fodders, and would include an inventory of the (scientific) Indian or tropical knowledge of techniques on conserving fodders for the off-season. Furthermore, it should include plans, demonstrations and to disseminate this knowledge to farmers (one must think of joining forces of farmers in rural areas to get scale advantages).

The organisations CKO, IIMF and Mulkanoor Womens Dairy could play a role to realise this. Although CRV delegates would be able to investigate plans together with these Indian organisations, this is not a CRV core business.

2. Improvement of genetics for dairy cattle improvement and artificial insemination services
   - Breed improvement within the local constraints of poor quality feed availability, high disease load, unsatisfactory hygiene and inadequate management skills
   - Better control of diseases (has become more and more important by increased transports of cattle and by increased mobility of people)
   - Uniform identification of animals and animal farms and registration systems to control genetics and diseases.

With help of Agriterra (and CKO) a further mission of CRV delegates could be prepared for:
   - Further inventory of AI quality, logistics and coverage of rural areas by CRV delegates as the initial mission was too basic and not covering the whole route.
   - Further inventory of the quality and logistics of progeny testing programs in the AP (India) by CRV delegates.
   - Further inventory of quality and logistics by CRV delegates on the handling of milk from farm to collecting / chilling centres and dairy factories.
   - CRV delegates must demonstrate to farmers associations, governmental institutions and the government why a uniform identification of animals and farms and registration systems are a prerequisite for control in dairy development and in genetic improvement.
   - CRV delegates could help in meetings / conferences organised by CKO or FFA-AP. Convincing the government and institutions like the Department of Animal Husbandry and NIDDB that availability of exogenous semen will help farmers and will challenge the Indian cattle breeding industry. Although sexed semen (e.g. 90% instead of 50% heifer calves born) is very expensive and for best results used on virgin heifers: it could be an alternative to imports of cattle.
3. Improvement of milk handling and increase of milk deliveries

- Learning farmers to wean their calves early and learning them to use milk replacers
- Improved handling of milk, including improvement to the supply / cold chain

In addition to the three abovementioned main recommendations, in general, dissemination of knowledge, training and advice would be needed.
Annexes

1  Programme
2  Terms of Reference
3  People interviewed
### Annex 1 Programme

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Time</th>
<th>Activity</th>
<th>Details in realised program</th>
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<tbody>
<tr>
<td>1</td>
<td>19th October, 2007</td>
<td>(A.M.)</td>
<td>Meeting with Executive Committee and Board of Trustees of Confederation</td>
<td>CKO representatives&lt;br&gt;Dr L Mohan of AP govt&lt;br&gt;Plus representatives of:&lt;br&gt;BAIF, FAA, IIMF, APLDA and others&lt;br&gt;Presentation of CRV HG&lt;br&gt;Meeting with FFA at FFA AP Office, Hyderabad.</td>
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<td></td>
<td></td>
<td>(P.M.)</td>
<td>of Kisan Organisations (CKO) and with officials of Animal Husbandry</td>
<td>Dinner hosted by Mr J. Madan Mohan Reddy at his residence</td>
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<td></td>
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<td>Dept., Govt. of Andhra Pradesh</td>
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<td>Evening</td>
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<td>2</td>
<td>20th October, 2007</td>
<td></td>
<td>Departure for Nizamabad - Indur Intideepam MACs Federation and Dairy</td>
<td>Plus:&lt;br&gt;Visit to a health centre (APLDA) Visit to educational and extension centre (IIIMF) meeting with women.&lt;br&gt;Visit to milk chilling centre of women's cooperative.&lt;br&gt;Stop at a day-time buffalo 'grazing area'&lt;br&gt;Stop at a backyard farm&lt;br&gt;Visit dairy farm of Mr Samson.</td>
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<td></td>
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<td>(IIIMF) by Road (150 Kms - 3½ Hours)</td>
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<td></td>
<td>Night Halt NIZAMABAD</td>
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<td></td>
<td>Hotel Kopila</td>
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<tr>
<td>3</td>
<td>21st October, 2007</td>
<td>(A.M.)</td>
<td>Visit to IIMF, Nizamabad</td>
<td>Visit IIMF Mr Samson 'How to help the poor farmers.'</td>
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<tr>
<td></td>
<td></td>
<td>(P.M.)</td>
<td>Mulkanoor Cooperative Women's Dairy</td>
<td>Plus: Visit Sheep growers Society and visit their flock (crossbreeds) Followed by visit to Mulkanoor Cooperative Women's Dairy (pasteurising-packaging) Visit Mulkanoor Coop Women's Dairy plant by Dr M Laxma Reddy Visit Headquarter Mulkanoor Coop Women's Dairy by Dr M Laxma.</td>
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<td></td>
<td>Return by Road and Night Halt at WARANGAL</td>
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<td>4</td>
<td>22nd October, 2007</td>
<td>(A.M.)</td>
<td>Visit Mulkanoor Cooperative and Women's Dairy Societies, Karimnagar Dist.</td>
<td>Id. plus:&lt;br&gt;Visit Private dairy farm of Mr Ramana Reddy Dairy Farm, Pedakur, Atmekur (Mendal).</td>
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<td></td>
<td></td>
<td>(P.M.)</td>
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<td></td>
<td></td>
<td>Mulkanoor Cooperative and Sheep Growers</td>
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<td></td>
<td>Aruna Dairy Farm - Private Dairy</td>
<td>Visit Mrs Aruna Dairy farm (entrepreneur)</td>
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<td>Plus: Visit young dairy farmer C Upender Reddy.</td>
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<td>Return to HYDERABAD Night Halt</td>
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<td>6</td>
<td>23rd October, 2007</td>
<td>(A.M.)</td>
<td>Visit to JK Trust Office and Operating-Centre</td>
<td>Visit Military Dairy Farm Secunderabad LtCol Susheel Sharma</td>
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<td></td>
<td></td>
<td>(P.M.)</td>
<td>Meeting with Andhra Pradesh Dairy Development Corporation (APDDC) and one Private Dairy around Hyderabad</td>
<td>Presentation APLDA an discussion A1 at their office, Hyderabad. Several scientists.</td>
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<td>7</td>
<td>24th October, 2007</td>
<td>(A.M)</td>
<td>Meetings with Director and Addl. Director of the Dept. of Animal</td>
<td>Visit to BAIF/RD Office, Kharamanghat Chourasta&lt;br&gt;Visit at CKO/office Hyderabad.</td>
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<td></td>
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<td></td>
<td>Husbandry (A.H.)</td>
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<td></td>
<td>(P.M.)</td>
<td>Afternoon Flight to Tirupathi, Chittoor (Dist.) by <strong>IC942 ETD 1245</strong></td>
<td>Visit to breed improvement centre Dr Ravi Kumar, frozen bull semen centre.&lt;br&gt;Visit A1 point and milkcontroller point for breeding program&lt;br&gt;Visit backyard farmer (test bull calf)&lt;br&gt;Visit revived Balaji Dairy plant (professional, ISO)&lt;br&gt;Visit milk collection point in remote area (liters and specific weight)&lt;br&gt;Visit remote farmer: 1.5 acres, 5 cows, 2 calves, 2 bullocks, electr straw cutter</td>
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<td>Day</td>
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<td>8</td>
<td>25th Oct</td>
<td>Visit farm along roadside, Visit Hindu Trustee farm Devasthanams Dr K Haranath Reddy, Visit meeting by CKO: local directors FFA, 10 leaders FFA (incl 5 women), scientists, local journalists</td>
<td>Hotel Fortune Tirupathi</td>
<td>Return by Afternoon Flight from Tirupathi by <strong>AIR DECCAN DN 410 ETD 1340</strong></td>
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<tr>
<td></td>
<td>25th Oct</td>
<td>Review Meetings and Feedback - Director and Adal. Director, Dept. of Animal Husbandry, Govt. of Andhra Pradesh</td>
<td></td>
<td>Chairman CKO, Mohan, Anil, Jayapal and Tirumala, Mr Samson, LtCol Sushil Sharma, Jthender Reddy, Supriya Balerao (Booksline), And others</td>
</tr>
<tr>
<td></td>
<td>26th Oct</td>
<td>Review Meetings and Feedback - Confederation of Kisan Organisations (CKO) and Late Evening - Meeting with Federation of Farmers Associations, Andhra Pradesh (FFA, AP)</td>
<td></td>
<td>Chairman CKO, Mohan, Anil, Jayapal and Tirumala.</td>
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<tr>
<td>9</td>
<td>26th Oct</td>
<td>Departure from India</td>
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<td>Id.</td>
</tr>
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</table>
Annex 2 Terms of reference

Mission # 5069 Assessment of needs for livestock improvement in Andhra Pradesh is an assignment within the framework of project Livelihood improvement of farmers and rural Women in India where Agriterra co-operates with the Confederation of Kisan Organizations (CKO). The Agriterra liaison officer responsible for this assignment is Michiel Bourgondiën.

Background
CRV (www.cr-delta.nl) is a leading cattle improvement co-operative with 34,000 members. The member-shareholders of CRV Holding BV are the Dutch Co-operative Cattle Improvement Delta (CRV) and the Flemish Cattle Improvement Association (VRV). CRV’s head office is located in Arnhem, the Netherlands. CRV’s mission is to create sustainable added value for cattle farmers through: (i) offering quality products and services; (ii) active involvement of members and employees; (iii) ongoing innovation and (iv) constant attention to trends in society. CRV actively supports dairy farmers in the field of breeding and fertility issues. CRV has developed several client-friendly tools that allow farmers to decide on cattle improvement investments and to monitor results.

CRV has approached Agriterra, indicating that it is interested to support developing countries in improving / professionalizing its livestock sector, mainly through cattle improvement programmes and advice to farmers. It intends to extend its international network. Agriterra has positively responded to this offer and has identified India and Rwanda as countries where farmers’ organisations have shown much interest in artificial insemination and cattle improvement.

Possible targeted organizations include the MACS of Intideepam Federation in Nizamabad, Cooperative Enterprise Mulkanoor and associated producers, CKO SHG and associated shepherds, associations connected to the Farmers Federation-AP and others.

In order to assess capacity gaps in the livestock sector in Andhra Pradesh, Agriterra commissioned a study to have a better understanding about livestock development in Andhra Pradesh. This study was carried out by Mr. Anil Kumar Epur in May/June 2007. The mission concluded that, among other, there is substantial scope for cattle improvement.

Objective(s)
The mission’s overall objective is to conduct an identification mission for possibilities to enhance farmers’ organisations capacities in cattle improvement in Andhra Pradesh. Special attention is given to dairy development, genetic dairy cattle improvement and artificial insemination services (the core business of the CRV).

Mission
The mission will be composed of Herman Vis and Theo vd Berg. Both are employees of CR Delta. During the mission, the will be accompanied by Anil Kumar Epur (working as advisor for Agriterra). Herman Vis will act as team leader. The mission will take place from 18 – 26 October.
Activities
A detailed programme of activities is under preparation. It is expected that the following organizations will be visited:

1. Indur Intideepam Macs Federation (IIMF), Nizamabad
3. Aruna Dairy Farm, Warangal
4. JK Trust’s Office & One Operating Centre
5. Department of Animal Husbandry, Govt. of Andhra Pradesh
6. Confederation of Kisan Organisations (CKO)

Expected results
The consultants are expected to prepare a mission report, containing information on the following issues:

- Analyse the context of livestock development in Andhra Pradesh with special attention to the role of farmers organisations
  - Identify bottle necks for cattle improvement by farmers organisations
  - Conduct or validate capacity building needs assessments for farmers’ organisations
  - Identify the added value of services that CRV can provide
  - Give a broad framework of the project
- Give recommendations for the way forward regarding the collaboration between CRV, Agriterra, and farmers organisations in Andhra Pradesh

Report guidelines (see annex)
## Annex 3 People interviewed

<table>
<thead>
<tr>
<th>Card No.</th>
<th>Agency</th>
<th>MAIN PERSONS MET</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Meeting with E.C. an BoT Members of CKO in Hotel Golkonda, Hyderabad</td>
<td>1. M. Gopalakrishna (chairman)</td>
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<tr>
<td>2</td>
<td>Dept. of Animal Husbandry</td>
<td>1. Minister of Agriculture AP</td>
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<tr>
<td>3</td>
<td>Federation of Farmers Associations</td>
<td>2. Dr. L. Mohan</td>
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<td>4</td>
<td>BAIF</td>
<td>1. P. Chengal Reddy</td>
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<td>5</td>
<td>Farmer (FFA)</td>
<td>S. Gopal F Reddy</td>
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<td>6</td>
<td>Military Farm, Secunderabad</td>
<td>Dr. M. Jintender Reddy</td>
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<td>7</td>
<td>Mulkanoor COOP</td>
<td>Lt Col Sushil Sharma</td>
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<td>8</td>
<td>Indur Intideepam MACS Federation, Nizamabad</td>
<td>M. Laxma Reddy</td>
</tr>
<tr>
<td>9</td>
<td>Devastanams Tirumala Tirupati</td>
<td>1. Mr. Samson (Director)</td>
</tr>
<tr>
<td>10</td>
<td>Aruna Dairy Farm</td>
<td>2. B. Umamaheswara Rao (CEO)</td>
</tr>
<tr>
<td>11</td>
<td>Warangal</td>
<td>Ms. Aruna (proprietrix)</td>
</tr>
<tr>
<td>12</td>
<td>FFA</td>
<td>Sri Hemchander (entrepreneur)</td>
</tr>
<tr>
<td>13</td>
<td>Bookslife</td>
<td>Mrs Supriya Bhalerao</td>
</tr>
<tr>
<td>14</td>
<td>Tirumala Tirupati Devasthanams</td>
<td>Dr K Haranath Reddy</td>
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<tr>
<td>15</td>
<td>Dr M Rama Rao</td>
<td>Dr K Haranath Reddy</td>
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<tr>
<td>16</td>
<td>IIMF</td>
<td>B Umamaheswara Rao (CEO)</td>
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<tr>
<td>17</td>
<td>WWF - India</td>
<td>Farida Tampal (State Director)</td>
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<tr>
<td>18</td>
<td>Farmer Frozen semen bull station</td>
<td>Upender Reddy</td>
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<td></td>
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<td>Dr Ravi Kumar</td>
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</tbody>
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Summary

The mission was implemented by Mr. Theo van den Berg of CRV and accompanied by Anil Epur, external advisor to Agriterra.

CRV (www.cr-delta.nl) is a leading cattle improvement co-operative with 34,000 members. CRV has approached Agriterra, indicating that it is interested to support developing countries in improving / professionalizing its livestock sector, mainly through cattle improvement programmes and advice to farmers. In order to assess capacity gaps in the livestock sector in Andhra Pradesh, Agriterra commissioned a study to have a better understanding about livestock development in Andhra Pradesh. This study was carried out by Mr. Anil Kumar Epur in May/June 2007. The mission concluded that, among other, there is substantial scope for cattle improvement.

The present mission’s overall objective was to conduct an identification mission for possibilities to enhance farmers’ organisations capacities in cattle improvement in Andhra Pradesh. Special attention is given to dairy development, genetic dairy cattle improvement and artificial insemination services (the core business of the CRV). The mission was able to collect a lot of information on cattle improvement and dairy farming. Although there are a lot of constraints and gaps in the livestock sector, it seems important to look at what role farmers’ organisations could play, and what is in the interest of their members. In this respect, there seems to be a lot of scope to explore the link between cattle improvement and increased milk production.

In relation to this, the mission identified three main fields for possible improvement: 1. Improvement of feed quality, feeding and fodder development 2. Improvement of genetics for dairy cattle improvement and artificial insemination services 3. Improvement of milk handling and increase of deliveries of milk

Authors

Theo P.R. van den Berg was as an child and adolescent working at the mixed crop and dairy farm of his parents, studied biology and became a specialist in animal reproduction (semen processing, A.I. and E.T.), animal breeding and quality assurance. Was 11 years General Manager of a Dutch ‘Cooperative Cattle improvement organisation’.

Anil V. Kumar Epur has a life-time experience in the international agro-business sector and is presently a Board member within the Confederation of Kisan Organisations (CKO) in Andhra Pradesh and does frequently perform consultancy assignments for Agriterra.
Abbreviations

A.I  Artificial Insemination.
AP  Andhra Pradesh
APLDA  Andhra Pradesh Livestock Development Agency
APRLP  Andhra Pradesh Rural Livelihoods Project.
CB  Crossbred.
CBIP  Cattle Breed Improvement Program.
Crore  100 lakh
DoAH  Department of Animal Husbandry.
EC  European Community
ET  Embryo Transfer
EU  European Union
FA  farmers’ association
GoI  Government of India
Ha  hectare
HF  Holstein Friesian
JKTGVY  J. K. Trust Gram
Lakh  100,000
MAC  Mutually Aided Cooperative Society
NABARD  National Bank for Agriculture and Rural Development.
NDDB  National Dairy Development Board
NGO  non government organization
SHG  Self Help Group
VAS  Veterinary Assistant Surgeon.
WTO  World Trade Organization
Y  Yersey
1. Introduction and preparation

CRV (www.cr-delta.nl) is a leading cattle improvement co-operative with 34,000 members. The member-shareholders of CRV Holding BV are the Dutch Co-operative Cattle Improvement Delta (CRV) and the Flemish Cattle Improvement Association (VRV). CRV’s head office is located in Arnhem, the Netherlands. CRV’s mission is to create sustainable added value for cattle farmers through: (i) offering quality products and services; (ii) active involvement of members and employees; (iii) ongoing innovation and (iv) constant attention to trends in society. CRV actively supports dairy farmers in the field of breeding and fertility issues. CRV has developed several client-friendly tools that allow farmers to decide on cattle improvement investments and to monitor results.

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The mission was implemented by Mr. Theo van den Berg of CRV and accompanied by Anil Epur, external advisor to Agriterria. Unfortunately, Mr. Herman Vis of CRV had to cancel his participation short before the mission due to personal circumstances.
2. Activities

2.1. Reports on visits

Beside stops at the 'one cow backyard' farms, I have visited the following farms:

Farm Mr Ramana Reddy Dairy Farm, Peddakur, Atmakur (Mandal)
The owner is an entrepreneur and is processing milk into ice creams. Some 4
labourers from the village take care for the farm and as could be seen with dedication.
15 Cows, a breeding bull, 2 bullocks, a char and an electrical straw cutter; sorghum
is the basis, extra concentrates and minerals are fed. From this farm the milk is partly
used for production of ice-cream in his own plant in the neighbouring city. The cows is
well taken care off; production is some 8 kg per cow; there is one with 15 kg. A good
performance under the given conditions, however superior dairy genetics would help.

Aruna dairy farm - Mrs Aruna
Aruna dairy farm where Mrs Aruna the proprietor is managing the dairy on daily basis
with 3 or more labourers from mostly Bihar. Some 20 Murrah buffaloes and 5 crosbred
cows are milked; the average yield would be 8 kgs. She created without any subsidy
her own biogas plant fed with cow dung. This supplies all the energy to meet farms
day to day requirement. Decomposed slurry together with other manure is used to
make 'wormy dung' a very effective manure which is easy to use in dry form. Her
greatest concern is the available workforce: overnight her labourers can be gone. The
local labourers are not any more interested in this farm work. Momentarily her farm
was suffering from FMD (a new strain of virus which was not covered by the
vaccination); the yield went down and she lost some cows. She feels the lower
yielding buffaloes are more resistant to diseases. In my opinion the Aruna dairy farm
could handle higher yielding cows; genetics are a constraint.

C. Upender Reddy, Station Ganapur, 501644 PIN Warangal district
Farm with 20 cows with small sized what the owner called HF-breed and 1 breeding
bull (high %-age HF). Almost all cows had some feet problem; his best cow was also a
small sized cow, high in HF blood and possibly some Yersey; Mr Upender told me that
she would produce 25 ltrs milk per day and her appearance confirmed this with well
developed milk veins and well attached udder, sound and strong feet and legs. His
major daily concern was to have electrical power available and to have labourers on
his farm. His milkers disappeared some weeks ago overnight from his farm, so he had
to milk all the animals himself. His AI-technician was reluctant to inseminate on his
farm because the farmer still kept using his own bull on other cows. The one excellent
cow and Mr Upender Reddy's demand for more of these cows, shows that the
availability of better suited genetics is a major constraint. The fat % of the cows was
estimated only 3,5%; with adequate genetics this farm could easily produce more milk
and 4,5% fat with the feeding knowledge of this farmer.

Dairy farm of Mr and Mrs Samson
They started as entrepreneurs inexperienced in managing a dairy farm 3 months
before my visit. The cows they bought were not bringing the yield of the milk they
expected; the milking machine (six milking sets) was not properly installed and
instructed by the provider so the animals suffered from mastitis; a lot of the logistics
in the lay out of the farm was not what could be expected of the provider. They have
the idea to help the backyard cow farmers to enlighten their work load with milking
their cows: in the backyards of the neighbours in a radius of two hundred meters
some 80 milking animals can be found. Some farmers share their electrical straw /
green fodder cutters. They hope to be an example to other farmers to share their
mechanisation, to become more efficient, profitable and to relief the working load.
Mr Samson has felt the constraints in the market for better yielding cows; that he had to buy on basis of breed and the appearance of the heifer and what the seller was promising about milk yields. No adequate genetic information was available.

Military dairy farm Secunderabad
The army produces her own foodstuff and may have dairy farms with more the 500 cows where with military discipline milk production is recorded. Nowadays they aim for crossbred cows with Sahiwal (38%) and HF (62%). This year aiming for an average standard lactation of 4000 kg in 310 days (non fat corrected milk; actual yield 3700 kg/day). This dairy totals 20 Lakh of milk per year. The army tested in the past crossbreeds of Ayrshire, Red Dane, Brown Swiss, HF and Yersey especially with Sahiwal (also Red Sindi and Haryana). Buffaloes they do not use anymore because of fertility problems. The army produces milk for tea, yoghurts, custards and small drinks.
The highest yielding cow at the Secunderabad dairy farm yielded 33 kg milk on her top per day and a lactation of 5000 in 310 days. The first calvings nowadays are at 24 months. One labourer on 25 cows; 3 times milking per 24 hours (by hand) in high yielding cows.

All heifer calves will be kept for replacement or for other military dairies in provinces where climate causes low fertility. Bull calves are given away to (poor) farmers. Sorghum is the basis of feeding; concentrates with balanced minerals are given on basis of production (production groups).

Available semen (central breeding by higher ranks not influenced by the unit managers) is from HF and FriesWal (HFxSahiwal) to breed for cows with 62%Hf and 38%Sahiwal; the unit manager has no genetic information, he does keep precise information on the pedigree. He thinks that cows with black colour spots on their skin are the better producers. (Cattle with dark skins is said to be more adaptable in warm climates).
In my opinion this dairy could easily handle far more higher genetics for milk yield and % fat. The manager was well aware of the individual differences of the animals, he has very good knowledge of feeding individual animals, but he lacks adequate genetics.

Sheep growers society in the Karimnagar district (CKO activity)
Some 20 members had gathered in a hall and some problems were discussed in Telegu.
Drought seemed to be the biggest problem. The visit to a flock revealed that they were working with a very old breed with a low bodyweight. The shepherds were content with the F1 mostly because of higher weights and they met some heterosis. However there were complaints with losses of sheep because of foot and leg problems.

Nizamabad district
This is a district with 36 mandels, 921 villages (61 villages are abandoned because of drought). 66% of farms is <1ha, 11 % <2ha totalling 60% of the land and 11% of farms >2ha totalling 40% of the agricultural land. There is a sense of pride in the villages that all their children are in schools. Four mandels achieved to have 100% of the children 5-14 years at schools (order: Country, State, District, Mandel and village).

The rain falls in the South West monsoon is usually more then 800 mm per year; the North East monsoon contributing about 40 mm per year. The last years there has been unusual drought and it is believed that the one cow/buffalo backyard farms was the mere reason that the people survived. Despite the usual 800mm rainfall the agriculture in the District is characterized by low productivity and mono cropping. Low productivity caused by absence of protective irrigation during the growing period, due
to uneven distribution of rain fall and erosion. The ground water level has dropped extremely low in most parts of the District. It was advised to decrease the growing of paddy and sugarcane and instead to grow crops such as maize, groundnut, sunflower, pulses etc., requiring less water. Last years there was seen a dramatic increase in suicides by farmers in the region. The cause of such suicides was usually the inability to cope with financial debts. The debts increased by private moneylenders, when credits from banks and co-operatives were reduced. However, suicides in other districts were higher where the one cow programs were not adapted.

**Chittoor district**
The district Chittoor in the south of AP with Tirupati as the main city is known as a cow belt (90% cows) where sorghum is the green fodder. Dairying is done all by women. Farms solely depending on dairying are seldom. In the past there were farms with 50 cows merely to bring transport and ploughing force, bullocks and manure.

A vigorous national policy starting in 1969 of land reform and placing a ceiling on personal income, private property, and corporate profits, seems not to have brought changes for the good.

Most dairy cows will be found in the hills as a more suited less warm climate. There is a lot of sugar cane farming (which depletes the water level). Chittoor is a drought area; lots of water pumps, lakes and canals for water supply help to make this area liveable. Horticulture (mango/ tomatoes) brings here a very good yield. Also peanuts are cultivated and there is silk production. The monsoon starts here in October/November while in the north of the AP the monsoon starts a few months earlier (June July).

Chittoor is a favourite destination for pilgrims. On some days in the year more then 60,000 pilgrims are visiting. Tirumala Tirupati Devasthanams is a religious based trust who produces milk for the pilgrims (30000kg per day) and feed them with own grown green fodders and use concentrates. They use AI and semen of HF – Yersey – Sahiwal crossbreeds. They want to increase production per animal; at the same time they take care for the low yielding cows for religious reasons. They claim not to be commercial.

**Chittoor: Frozen semen bull station**
Dr Ravi Kumar is the head of a ‘frozen semen bull station’ near Tirupati. Since 1990 the station became a semen bank (like 4 other former semen collection centres in the AP). Already in the early sixties, bull semen was frozen here. During 1964 up to 1980 Jersey and HF were the main breeds in these stations. Since 1994 crossbred bull semen was introduced: at first Y*Tharparkar, later HF*Sahiwal and now solely Y*Sahiwal. Dr Ravi has six years experience with a field progeny testing program.

Now a batch of 15 test bulls is available; 2000 doses per bull is set out in the field institutions; the heifer calves are ear tagged; milk production registration is done: 1st between 10-12 days p.p., followed by sampling once a month; 11 months recording; 305 days lactation yields.

There are professionally managed dairy plants (Balaje Dairy, Tirupati; Mulkanoor Womens Cooperative plant) where milk is de cremed and pasteurised; these plants can easily market the double of their products. The milk is partially shipped over very long distances e.g. to New Dehli some 2000 km by road. In the plants mostly man are working; for women it would not be feasible to work at 4 o’clock in the morning away from their house / farm.

**Chittoor: Milk collecting center for the Balaji dairy plant**
Visited a milk collecting centre for the Balaji dairy plant in a remote area. Women bring in the milk mostly in an open can with a narrow neck, mostly 1-2 ltr.

Registrations on the milk: farmer, specific gravity, quantity and quality (sweet or sour); the milk is filtered and put in cans of 30 liters. Then the milk is brought to