Livestock is one of the primary sources of sustenance for the poor, particularly the extreme poor. A large number of farmers involved in cattle fattening and they get more profit after rearing them for 3 to 4 months and sell in the market which ensure their livelihood. Any death or disease of animals can lead to complete devastation of a poor household, which often rely primarily or sometimes solely on income from their livestock. It is of utmost importance to ensure healthy livestock through preventive measures and timely intervention during an abnormality before it turns serious. Systematic and regular monitoring of the health of livestock is critical to ensuring appropriate management. Effective management of livestock is a critical challenge for development organizations dealing with poverty reduction and livelihood programs. The livestock offers important employment and livelihood opportunities particularly for the rural poor, including the functionally landless, many of whom regard livestock as a main livelihood option. About 75 percent people rely on livestock to some extent for their livelihood, which clearly indicates that the poverty reduction potential of the livestock sub-sector is high. According to Bangladesh Economic Review, (2006), the growth rate in GDP in 2004-05 for livestock was the highest of any sub-sector at 7.23%, compared to 0.15% for crops, and 3.65% for fisheries sub-sector. The growth opportunities in the livestock sub-sector vary significantly among the species. Qualitative rather than quantitative development of large ruminants like cattle and buffalo keeping emerges as promising to offer substantial growth potentials with a positive impact on nutrition, employment and poverty alleviation. Research and technological development merit priority to counteract allied problems in the fields of feed, breed and disease and meet the challenge of the country’s livestock sector in the 21st century. But scarcity of expert veterinarian in the remote places is giving Bangladesh a challenge of hurdles in terms of disease tracking and livestock monitoring and management. Mobile telephony has been particularly growing very fast rapid in Bangladesh, fuelled by an increasingly competitive marketplace, and regulations conducive for expansion. Falling of voice call and sms, handset prices, and improved network coverage and quality (up to 98% of the country) is a significant change. This made an exponential growth in the number of mobile subscribers, rising from approximately 5m in 2004/05 to 85.44 million in 2011 (BTRC, 2011). Internet usage was far more ahead in its growth. As there is coverage of mobile networks in most of the part of the country, so ICT4D or M4D can made a huge change in the agri related service sector of Bangladesh. Drastically lowering price of smart phones, emergence and proved model of mHealth in different sector of health service made the value of creating mLivestock service model for poor beneficiaries in the country.

**SUMMARY OF FINDINGS/ RECOMMENDATIONS**

1. **Scarcity of Veterinarians in the remote place of the country:** Experienced veterinarians are rare and expensive and so there is often no systematic tracking of livestock health based on which veterinarians can take decisions remotely without physical presence.

   **Recommendations**

   As Bangladesh has mobile coverage in almost every place of the country so tools and accessories for a smartphone based monitoring and management should be provided at sub district level

2. **Use knowledge of Veterinarians through ICT devices:** Local livestock personnel or para-vets are sometimes not knowledgeable enough to take decisions whenever cattle are in abnormality. So local livestock worker should be trained on how to collect information through smart phone based application and these paravets will be connected by a veterinarian who will be dedicatedly check field level information of cattle in their PC or laptop and through their expert feedback.

3. **‘Intelligent’ livestock management system’s Key findings**

   - Identified what kinds of decisions/feedback are possible or medically acceptable for a remote veterinarian based on information collected by field level livestock personnel
I. CONTEXT AND RESEARCH MODEL
The pilot was implemented by mPower Social Enterprises Limited, who works in the sector of ICT4D and M4D and to empower NGOs, governments and other social sector organizations with technology. mPower partnered and examined the pilot in the field of NETZ Bangladesh, an INGO who works as Development partner. The pilot was supported by Stimulating Household Improvement Resulting in Economic Empowerment (SHIIREE) Project of UK Department of International Development (DFID).

The local livestock personnel or para-vet carried an Android mobile device with software that has a triage-based information collection mechanism. The information collected has been sent to a decision-support system (DSS) of each livestock cattle. In case where there is no internet connectivity, the data was stored in the mobile device (offline mode). The users sent those offline data to the server when the connection is restored. An experienced veterinarian looked at the information on a web-based interface and directs the local-level field staff accordingly. In case of emergency situation cattle were sent to local animal health clinic which is situated in an Upazilla (Sub-District). Automated alert on vaccination and de-worming of cattle generated based on collected information which was built on the Android application.

II. METHODS
Total Four field level staffs bearing a mobile handset with application were selected for data collection of the cattle. So, field level digitized data (Primary Data) came from the field which was stored in the server for analysis. The selection of the beneficiary cattle was done randomly. Two frontline project staff where the pilot was conducted selected their beneficiary cattle on a random basis. These staffs work in the partner NGO who has their own beneficiaries in the project location. And other two of Local Livestock worker (LLW) or paravet also selected the beneficiary on random basis as well. The LLW are the local service provider who resides in the community. The plan was to compare the service between project staff and local service provider. The idea was to see the response mechanism of the beneficiary as they take the service from LLW on paying basis.

III. RESULT DISCUSSION
Total 495 livestock cattle’s information was sent by the LLW (Local service provider) and NGO Staff through smart phone in a period of two months. Among those cattle 24.71% of bull category was registered where as 75.29% bull was registered by the NGO staff. That means, the sellable cattle were mostly covered by the NGO staff from where the beneficiaries can make their income. 95.52% cows were covered by the LLWs and these are mostly milking cow from where the beneficiaries are making their income by selling milk.

<table>
<thead>
<tr>
<th>Sickness</th>
<th>LLW Coverage</th>
<th>NGO Staff coverage</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>91.33%</td>
<td>97.16%</td>
<td>94.48%</td>
</tr>
<tr>
<td>Sick</td>
<td>8.67%</td>
<td>2.84%</td>
<td>5.52%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Among the cattle most of them are found healthy in these two months period of the pilot. More than 90% of the cattle’s in both the cases of LLW and NGO staff were found healthy that’s means they did not get diseases in registration and follow up periods.

The beneficiary farmer sells their cattle in the local market to gain profit after a certain period of time. Total 21 cattle are sold during this two months pilot. Maximum 45 % profit was gained by a farmer which was covered by NGO staff. Three of the farmers gained a loss and one of them loose 16 percent due to poor amount of food and care. One farmer covered by LLW who gained neither loss nor profit.

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Figure 1. Mobile phone based intelligent livestock model