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Meat Sector Outcome Report

December 2015



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Acronyms

BGM	Business Group Member
CLP-2 (or CLP)	Chars Livelihoods Programme, Phase 2
iDE	International Development Enterprises
IMFP	Integrated Meat and Fodder Market Development Project
IMLC	Innovation, Monitoring, Learning and Communications Division of CLP
LBG	Livestock Business Group
M&E	Monitoring and Evaluation
M4C	Making Markets Work for the Chars
M4P	Making Markets Work for the Poor Approach

Executive Summary

The market development component of CLP applies the M4P approach to facilitate change in livestock-related market sectors - the milk sector and the meat sector. The market development project for meat sector is a component of CLP named as Integrated Meat and Fodder Market Development Project (IMFP) that is being implemented by iDE Bangladesh since September 2012. IMFP aims to increase income of livestock producers through developing the market systems, engaging private sector actors and incentivizing char producers to adopt improved rearing practices and technologies for improved productivity and higher profit. iDE and CLP jointly carries out regular monitoring of the IMFP performance against outcomes indicators of this project.

This outcome report presents an overview of the performance of meat sector market in the chars over the last 20 months from February 2014 to October 2015 through data collected in 10 meat producer treatment surveys and 6 control surveys. Bi-monthly progress for key indicators have been compared between October'15 and August'15 treatment surveys. Baseline information has also been included in the report to enable comparisons of results against same indicators over time. Besides, comparisons have been made for some indicators between control survey and treatment survey of October 2015.

Key findings:

- 2.3% of Business Group Members (BGMs) has reported purchase of Napier and/or Jumbo grass in the last 2 months in against of 0% members in the control group in October'15 survey, whereas the baseline was 1.3% only. This percentage reached a maximum of 8.2% in April'15 survey. The purchase of fodder in last 2 months (2.3%) has coincided with subsequent cultivation of fodder by BGMs in the last 12 months. Fodder cultivation by BGMs has shown a steady increase, reached its maximum of 33% in June'15 survey and has slightly decreased to 31% in October'15 treatment survey. In control group, only 9% members have cultivated Napier and/or Jumbo grass in the last 12 months as reported in October'15.
- % of BGMs purchasing ready feed in October'15 has increased steadily and reached its maximum of 68%, compared to the baseline of only 9.9%. In contrast, only 5% cattle rearers from control group provided ready feed to their cattle in October'15.
- % of BGMs purchasing deworming for their cattle at appropriate intervals has increased to its maximum of 80% in October'15 treatment survey, against a baseline of 8.2%. In contrast, only 51% cattle rearers in the control group purchased deworming tablets in October'15.
- The purchase of any type of vaccination by BGMs has increased significantly and reached its maximum of 58.0% in October'15 treatment survey, compared to the baseline of only 2.0%. However, purchase of vaccination by control group cattle rearers has decreased to 2.5% in October'15.
- % of cross-breed bulls has increased to 61.0% in October'15 from 56.2% in August'15 treatment survey. In contrast, 51.6% cross breed bulls reared by control group members in October'15.

- The average length of rearing cycle per cattle has decreased to 3.4 months in October'15 from the baseline of 5.1 months and the cycle was 3.9 months in August'15 treatment survey. In the control group, this rearing cycle has been 4.1 months in October'15.
- Mean profit per cattle per month has increased to 2,564 Taka per cattle per month in October'15, compared to 1,387 Taka in the baseline and 1,551 Taka in August'15 treatment survey. Hence, the 1st milestone of "50% profit increase over baseline by BGMs" has been achieved in October 2015. The target was that BGMs would gain average profit of 2,081 Taka per cattle per month within January 2016. But, in against of the 2nd milestone of "50% of members will show a 50% profit increase over baseline", 44% BGMs have achieved the target at October'15, i.e. 88% of target of BGMs has been achieved. In October'15 control survey, profit per cattle per month in the control group has been 1,624 Taka per cattle per month only.
- 68% (354) of the BGMs provided ready feed to their eligible cattle and the mean amount of ready feed provided per cattle per day has increased to 579 gram in October'15 treatment survey, compared to 244 gram in baseline survey and 423 gram in August'15 treatment survey. In contrast, only 5% (3) of the cattle rearers in the control group has provided ready feed to their cattle and the mean amount has been 509 gram of ready feed per cattle per day in Octobers'15.
- Mean body weight gain per head of cattle per day has decreased to 203 gram in October'15 from 251 gram in August'15 treatment survey. This amount has been 168 gram per head of cattle per day in the control group in October'15. Current body weight gain measurement system requires 2 weight measurements of same cattle in 2 successive surveys; hence cannot measure the weight gain by already sold cattle within 2 months before survey starts. It is highly probable that the cattle which already have been sold have gone through proper improved diet before selling and they might have gained much more weight compared to remaining cattle.

**** Green = "Good", Yellow = "Moderate" and Red = "Poor" performing indicators**

The following table summarises performance against key indicators in the meat sector:

Table 1: Summary of performance against key indicators

INDICATOR	Baseline	Treatment Survey Aug 2015	Treatment Survey Oct 2015	Control Survey Oct 2015	Baseline Source
% of BGMs purchasing Napier and/or Jumbo grass in the last 2	1.3%	2.2%	2.3%	0%	December 2013 Control
% of BGMs cultivating Napier and/or Jumbo grass in the last 12	-	33%	31%	9%	NA
% of BGMs purchasing ready feed in the last 2 months	9.9%	60%	68%	5%	December 2013 Control
Mean quantity (g) of ready feed provided per head of cattle per day	244	423	579	509	December 2013 Control
% of bulls reared which are cross-breed	7.3%	56.2%	61.0%	51.6%	December 2013 Control
% of BGMs purchasing de-worming tablets for bulls during the last 6 months	8.2%	77%	80%	51%	December 2012 Baseline survey
% of BGMs purchasing any vaccination for bulls during the last 6	2.0%	23.3%	58.0%	2.5%	December 2012 Baseline
Average length of rearing cycle for bulls (months)	5.1	3.9	3.4	4.1	December 2013 Control
Mean body weight gain (g) per head of cattle per day	300	251	203	168	December 2012 Baseline
Mean profit per head of cattle per month (taka)	1387	1551	2564	1624	December 2012 Baseline

The baseline data has been drawn primarily from the December 2012 baseline survey, though for some indicators it has been taken from the December 2013 control group survey, either because data were not collected for these indicators in the December 2012 baseline survey or because the indicators were measured differently. The methods used for the December 2013 control group survey data collection were more similar to the new monitoring system which was introduced in May 2014.

1. Background

Integrated Meat and Fodder Market Development Project (IMFP), implemented by International Development Enterprises (iDE), is a component of the Market and Livelihoods Unit of the Chars Livelihoods Programme (CLP), funded by UKaid through Department for International Development (DFID) and the Australian Aid through Department of Foreign Affairs and Trade (DFAT), and sponsored by the Rural Development and Cooperative Division of the Ministry of Local Government, Rural Development and Cooperatives.

The market development component of CLP applies the M4P (Making Markets Work for the Poor) approach to facilitate change in livestock-related market sectors - the milk sector and the meat sector. The market development project for meat sector, IMFP is being implemented by International Development Enterprises (iDE) since September 2012. IMFP aims to increase income of livestock producers through developing the market systems, engaging private sector actors and incentivizing char producers to adopt improved practices and technologies for improved productivity and higher profit.

iDE and CLP jointly carries out regular monitoring of performance against outcome indicators of the meat market development project.

A baseline study was conducted in December 2012 and outcomes-monitoring surveys began in September 2013. The monitoring system used during the initial surveys caused difficulties with identification of the same cattle over different surveys and in the measurement of certain indicators. In response, the methodology was redesigned and the first survey using the new system was carried out in May 2014. The new system has proved successful in identifying the same cattle at different points in time and in measuring key indicators accurately. From May 2014 onwards, the surveys are being carried out every two months using this new system. These surveys allow measuring outcomes of the meat market development project against the baseline.

In the meat sector, from a total of 2,652 meat business group members (BGM), 850 BGMs have been selected for the bi-monthly survey using the new monitoring system. Cluster sampling method has been used for selecting representative samples from different districts where the IMFP is being implemented and the number of sample are proportionate to the number of meat BGMs they consist of. (A full description of the methodology is described in the Market Development M&E plan, July 2013). In October 2015 meat producer treatment survey, the survey team has been able to reach 802 BGMs.

Besides, bi-monthly control group surveys were introduced since December 2014 to allow demonstrate the outcome of the project and till now, six rounds of data collection have been completed. A sample of 105 cattle rearers has been selected for control group survey and 99 members have been reached in October 2015 control survey.

This outcome report presents an overview of the performance of meat sector market in the chars over the last 20 months from February'14 to October'15 through data collected in ten meat producer treatment surveys and six control surveys. Bi-monthly progress for key indicators have been compared between October'15 and August'15 treatment surveys. Baseline information also has been included in the report to enable comparisons of results

against same indicators over time. Besides, comparisons have been made for the key indicators between control survey and treatment survey of October 2015.

Table 2: Survey periods from February 2014 to October 2015

SL #	Survey Name	Treatment Survey Period	Control Survey Period
1	May 2014	1 February'14 - 31 March'14	NA
2	June 2014	1 April'14 - 31 May'14	NA
3	August 2014	1 June'14 - 31 July'14	NA
4	October 2014	1 August'14 - 6 October'14	NA
5	December 2014	7 Oct'14 – 26 Dec'14	7 Oct'14 – 22 Dec'14
6	February 2015	27 Dec'14 – 18 Feb'15	23 Dec'14 – 15 Feb'15
7	April 2015	19 February'15 - 11 April'15	16 February'15 – 11 April'15
8	June 2015	12 April'15 - 6 June'15	12 April'15 - 7 June'15
9	August 2015	7 June'15 - 20 August'15	8 June'15 – 21 August'15
10	October 2015	21 August'15 - 22 October'15	22 August'15 - 23 October'15

Baseline data has been included to enable comparisons of results against the same indicator over baseline. The baseline data is drawn primarily from the December 2012 baseline survey, though for some indicators it has been taken from the December 2013 control group survey; either because data was not collected for these indicators in the December 2012 baseline survey or because it was measured differently and the methods used for the December 2013 control group survey data collection were more similar to the new system. The annex reports the results from all previous surveys since May 2014.

This report presents a summary of progress against key outcome indicators at final treatment survey conducted in October 2015 and compared the results with baseline survey at 2012/2013, with treatment survey at August 2015 and Control survey at October 2015. The detail summary of performance against key indicators from Dec'14-Oct'15 treatment survey is attached in the [Annex](#) part of this report.

The outcome indicators are presented under three broad categories:

1. Input Purchasing and Production Practices
2. Production and Productivity
3. Sales and Profits

2. Input purchasing and production practices

2.1 Purchasing of improved fodder varieties by BGMs

Feeding cattle with high quality fodder is crucial to increase the productivity of beef fattening. The project has placed significant emphasis on achieving this goal, by promoting the usage of two types of grass- Jumbo grass and Napier grass- which have significant potential on the chars. BGMs could access these types of fodder through two channels; the first is cultivating fodder, and the second is purchasing it. The table below summarises the percentage of beef BGMs purchasing either Napier or Jumbo.

This is important to note that the December 2013 control group survey (which represents the baseline in this case) gathered data about purchasing over the entire rearing cycle, compared to around two and months in last survey. Given the fact that the December 2013 control group survey figures might have been slightly inflated due to large recall period relative to those gathered in the regular surveys.

Table 3: % of BGMs purchasing Napier and/or Jumbo grass in the last 2 months

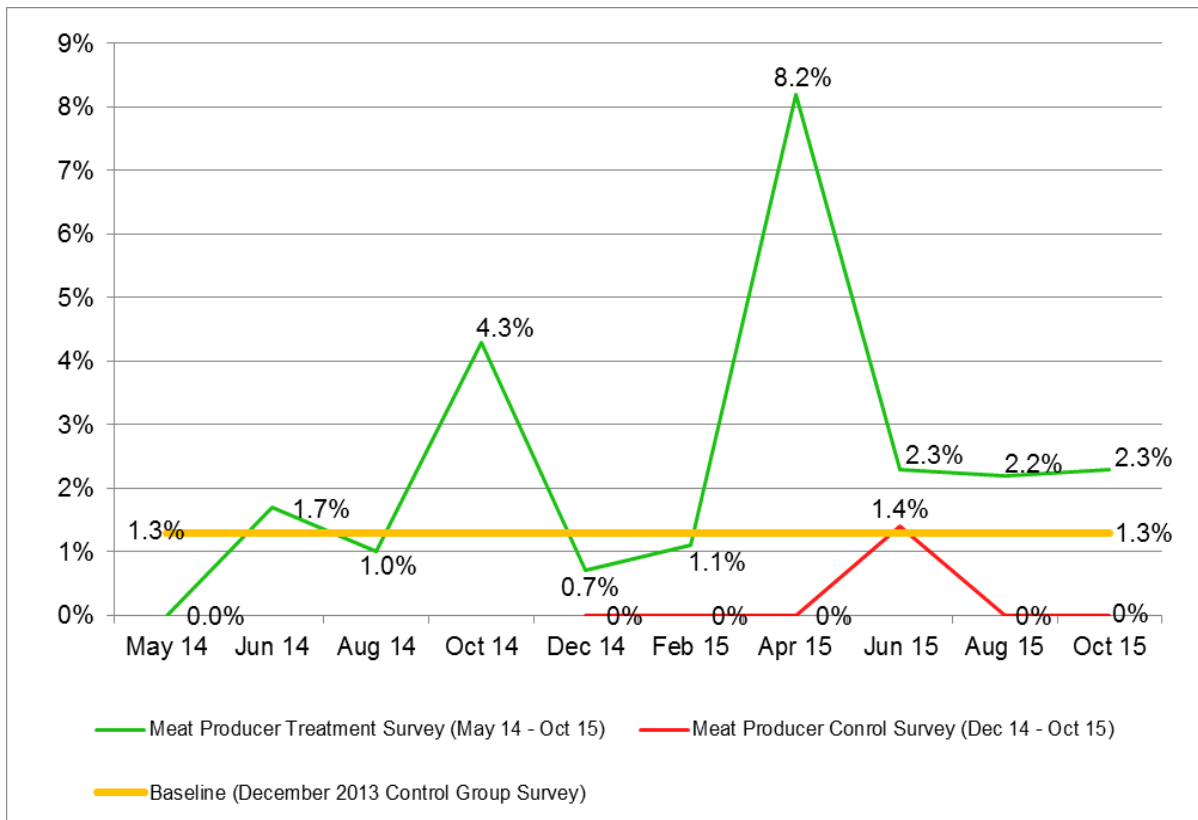
INDICATOR	Baseline December 2013	Treatment Survey August 2015	Treatment Survey October 2015	Control Survey October 2015
% of BGMs purchasing Napier and/or Jumbo grass in the last 2 months	1.3%	2.2%	2.3%	0%
% of BGMs cultivating Napier and/or Jumbo grass in the last 12 months	NA	33%	31%	9%

The results show that % of Business Group Members (BGMs) purchasing Napier and/or Jumbo grass has increased from the baseline of 1.3% to 2.3% in October'15 treatment survey. This percentage reached a maximum of 8.2% in April'15 treatment survey. In contrast, none of the control group members purchased fodder in 3 consecutive surveys from December'14 to April'15. Only 1.4% control group cattle rearers purchased fodder in June'15 and 0% members reported fodder purchase in both August'15 and October'15 surveys.

Among 850 BGMs surveyed in meat producer treatment surveys from May'14 to Oct'15, 13% BGMs purchased fodder, 48% BGMs cultivated fodder; and overall 56% BGMs accessed improved fodder (Jumbo or Napier grass) through either purchase or cultivation at any point during the survey period.

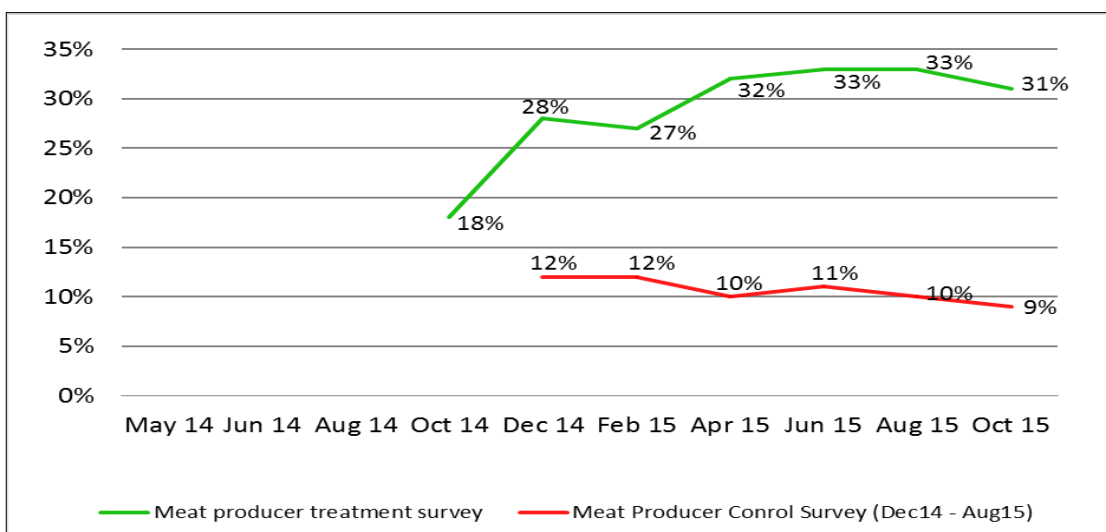
The following graph reflects fodder purchasing behaviour among the members of treatment groups and control groups over period of time compared to the baseline:

Figure 1: % of BGMs purchased Napier and/or Jumbo grass in last 2 months



The purchase of fodder has always coincided with a subsequent cultivation of fodder by BGMs. Fodder cultivation by BGMs in the last 12 months has steadily increased, reached its maximum at 33% in June'15 and slightly decreased to 31% in October'15 treatment survey. Besides, 79% BGMs of October'15 treatment survey consider that feeding Jumbo or Napier to their cattle is 'very effective' for beef fattening, compared to only 21% members of control group in October'15. This perception has been reflected in their behaviour of fodder purchasing (0%) and cultivation (9%) by the control group members in October'15 control survey.

Figure 2: % of BGMs cultivated Jumbo or Napier in the last 12 months



2.2 Ready feed purchasing and usage

The IMFP project has promoted the use of ready feed¹, which is fed to beef cattle in the commercial farming sector as a ‘nutrient top-up’ to the beef animals’ main feed/diet of fodder in able to improve and accelerate daily live weight gain (DLWG) growth and to increase the productivity of beef fattening.

Targeted cattle for beef fattening business should be the adult bulls only, since productivity and profitability is higher for these types of cattle. In addition, ready feed is not suitable for bulls under 12 months, if it is a cross breed and the bulls under 15, if it is a local breed. Considering this appropriate age limit, the percentage of BGMs purchased ready feed has been calculated.

Table 4: % BGMs purchasing ready feed in the last 2 months

INDICATOR	Baseline December 2013	Treatment Survey August 2015	Treatment Survey October 2015	Control Survey October 2015
% of BGMs purchasing ready feed in the last 2 months	9.9%	60%	68%	5%

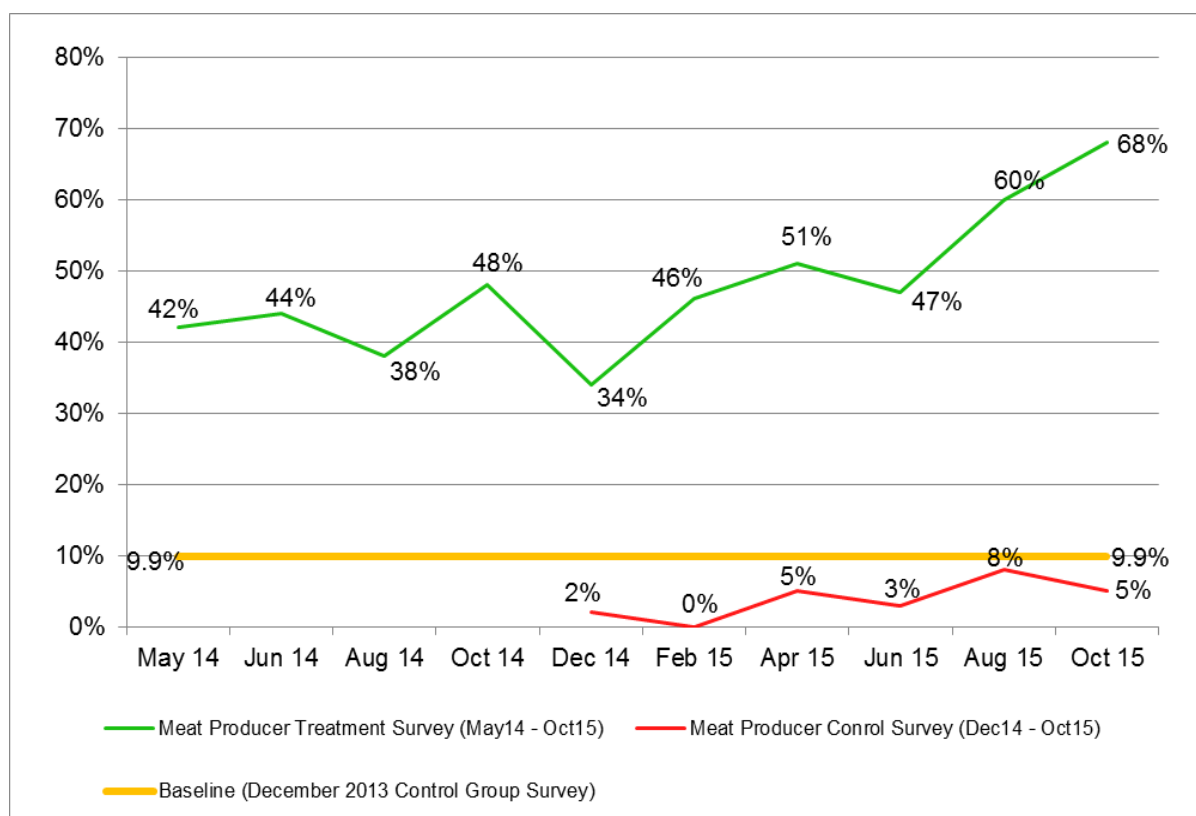
The above table shows that the percentage of BGMs purchasing ready feed is significantly higher in October 2015 treatment survey than the members in control survey. The percentage of BGMs purchasing ready feed in October’15 has increased to its maximum of 68% from the baseline of only 9.9% in December’13. In contrast, only 5% cattle rearers from control group provided ready feed to their cattle in October’15 survey.

Over the last 20 months, 83% BGMs purchased ready feed for their cattle and 71% of all bulls reared was provided with ready feed at least once during the rearing cycle. Practice of providing ready feed increased as the bull reached to the end of rearing cycle. 85% of BGMs, who sold cattle, provided ready feed to their cattle at any point over the last 20 months.

The following graph reflects purchasing behaviour of ready feed among the members of treatment groups and control groups over period of time compared to the baseline:

¹**Ready feed:** Feed pellets manufactured from various crops, crop residues, cereal by-products, vitamins, minerals and so on. Mixtures are formulated to provide appropriate rations of specific nutrient groups required for optimal beef or milk production.

Figure 3: % of BGMs purchased ready feed in last 2 months



The results stated in the graph above suggest that significant positive change has occurred among treatment group members regarding purchasing of ready feed. But there has not been any positive change among control groups and the trend for the control group lies below baseline. 68% of the BGMs provided ready feed to their eligible cattle in October'15 treatment survey, compared to 60% in August'15 treatment survey. In contrast, only 5% of the cattle rearers in the control group has provided ready feed to their cattle in October'15 control survey.

The following table presents the mean quantity of ready feed (in gram) provided to each head of cattle per day:

Table 5: Mean quantity of ready feed (g) provided to each head of cattle per day

INDICATOR	Baseline December 2013	Treatment Survey August 2015	Treatment Survey October 2015	Control Survey October 2015
Mean quantity (g) of ready feed provided per head of cattle per day	244	423	579	509

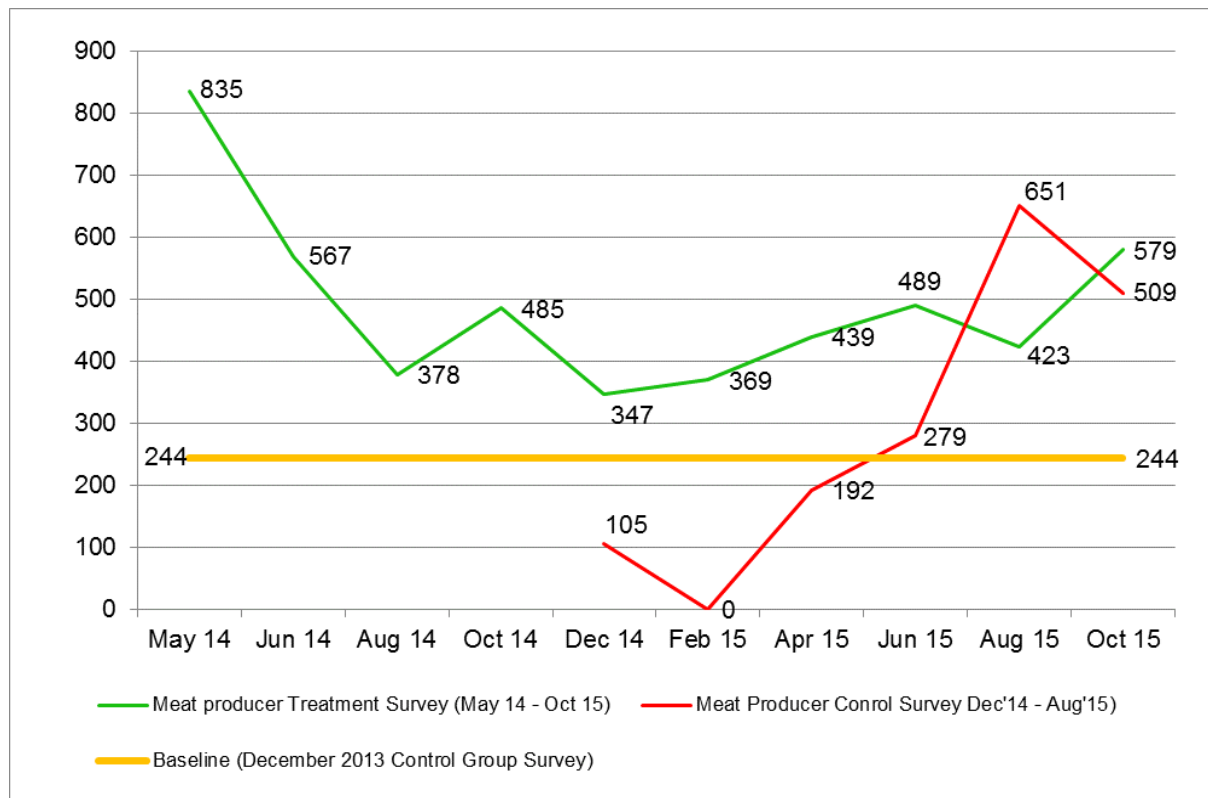
** Mean quantity is calculated for those BGMs who provided ready feed to their cattle*

The mean amount of ready feed provided per cattle per day has increased to 579 gram in October'15 treatment survey, compared to 244 gram in baseline survey and 423 gram in August'15 treatment survey. In contrast, among the control group cattle rearers who provided ready feed to their eligible cattle, the mean amount of ready feed has been 509 gram per cattle per day in October'15 control survey.

Taken alone, these results do not permit interpretation about whether each head of cattle has consumed the optimal quantity of ready feed for beef fattening, as this quantity must be analysed at the level of the individual head of cattle and requires detailed information regarding other feeds provided- particularly the quantity and quality of the fodder in the diet, cattle’s age, weight and other production factors.

The following graph shows average ready feed usages by the members of treatment groups and control groups over period of 20 months compared to the baseline:

Figure 4: Average ready feed provided per cattle per day



Among the 68% (354) of the BGMs who provided ready feed to their eligible bulls, the mean amount of ready feed provided per cattle per day has increased to 579 gram in October’15 treatment survey; compared to 244 gram in baseline survey and 423 gram in August’15 treatment survey. In contrast, among the 5% (3) cattle rearers who provided ready feed to their eligible cattle, the mean amount of ready feed has been 509 gram per cattle per day in October’15 control survey.

When interpreting these results, it is important to note that the December 2013 control group survey gathered data about purchasing over the entire rearing cycle, compared to that of two months in the bi-monthly surveys. Given the fact, the December 2013 control group survey figures were inflated.

2.3 Cattle breed

The fattening of cross breed (hybrid) bulls, which can grow to a bigger size and weight, is another key route to increasing productivity and profits from beef fattening. For beef cattle fatteners, this is achieved through procurement of an adequate supply of cross breed bulls for sale at the local market (hat). The supply of cross breed cattle is still limited at local markets, hence many BGMs still have to purchase local breed cattle which are smaller in size and light in weight compared to cross breed (hybrid) cattle. Interventions have been taken under this project to increase the supply of cross breed cattle in the market as well as to encourage the farmers to rear the cross breeds. However, measuring change in supply of cross breed cattle in the market is out of scope of this survey, but it collects information and reports change in farmer's rearing practice.

Although individual cattle may be made up of varying percentages of each component breed and different breeds vary significantly in their characteristics, broadly speaking, an increase in the percentage of cross breed cattle would signify improvements in breed. With this in mind, the monitoring system collects data on the breeds of cattle reared by the BGMs.

Figure 5: % of cross-breed bulls reared in last 2 months

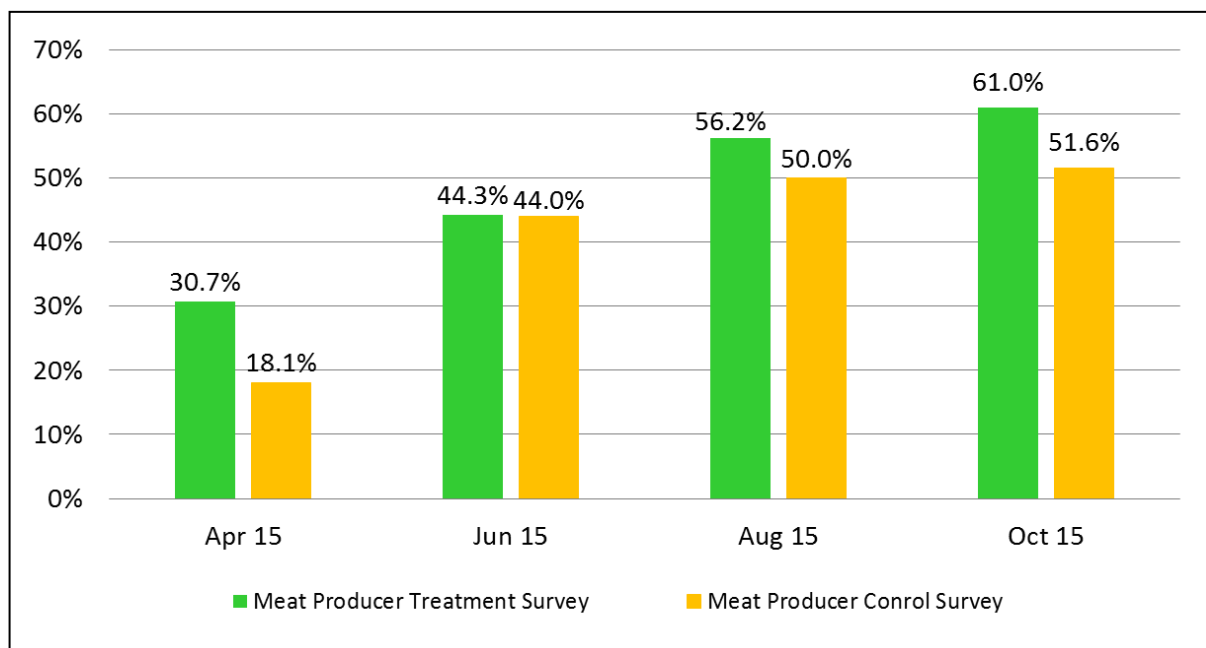


Figure 4 shows that the percentage of cross-breed bulls reared has steadily increased and reached its maximum of 61.0% in October'15 from 30.7% of April'15 treatment survey, compared to 51.6% cross breed cattle reared by control group members in October'15 control survey.

Besides the interventions under meat market development project, there might have been some other factors which have been significantly influencing to increase rearing practices of cross breed cattle by the rearers of both treatment and control groups in the char areas. But it was beyond the scope of this meat survey to identify those factors.

2.4 De-worming and vaccination

De-worming

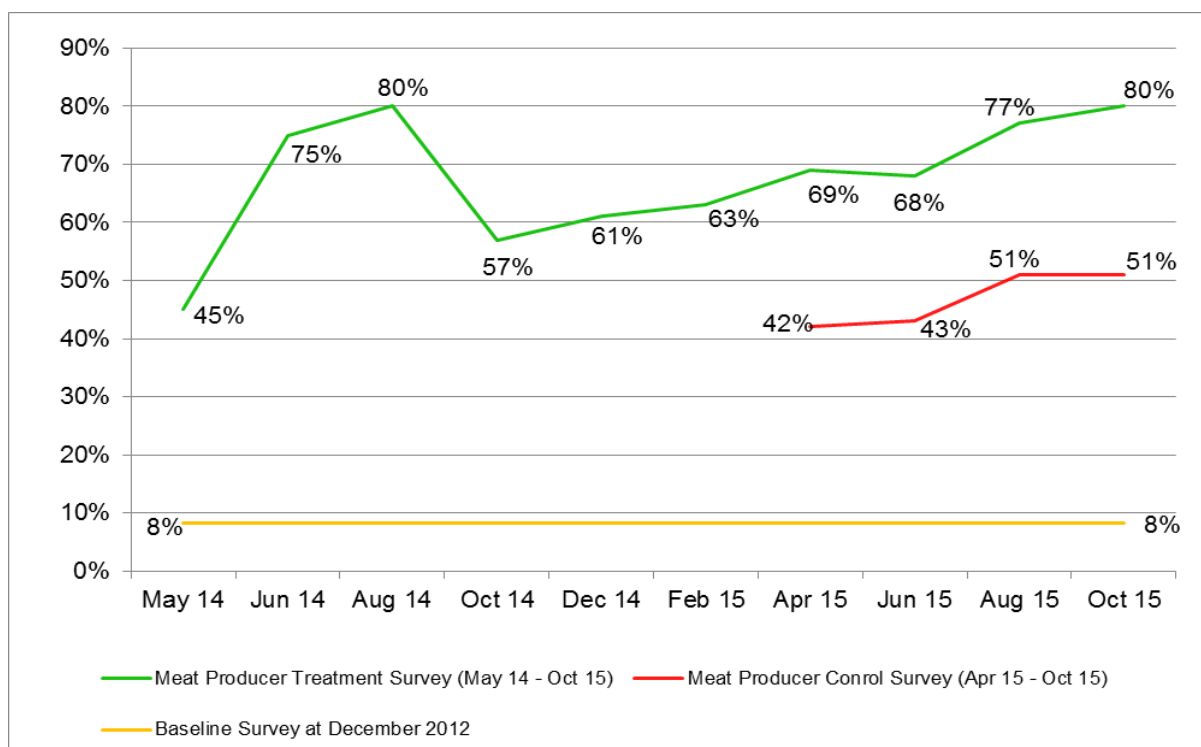
Correct practices of de-worming and vaccination are keys for improving cattle health and increasing productivity through beef fattening. The table below presents the key results to date in relation to de-worming.

Table 6: % of BGMs purchasing de-worming tablets for bulls during the last 6 months and % of bulls de-wormed in the last 6 months

INDICATOR	Baseline December 2012	Treatment Survey August 2015	Treatment Survey October 2015	Control Survey October 2015
% BGMs purchasing de-worming tablets for bulls during the last 6 months	8.2%	77%	80%	51%
% of bulls de-wormed in the last 6 months	8.2%	60%	62%	36%

The above table shows a significant improvement in this area. This is an encouraging sign that most of the BGMs (80%) have already adopted the practice of de-worming. Furthermore, it shows that de-worming services² are available for char-dwellers to purchase locally. The following graph shows purchasing practices of de-worming tablets by treatment and control group members over period of time compared to the baseline:

Figure 6: % BGMs purchased de-worming for bulls during the last 6 months



² Cattle services are actually provided in a batch via CLP and DLS organised “Vaccination and De-worming Camps”, i.e. whenever a Livestock Service Provider (LSP) visits an area, s/he provides services to all cattle in that area (if the rearer asks for it) and general services like deworming, any kind of vaccination etc. are provided simultaneously.

Percentage of BGMs purchasing deworming for their cattle at appropriate intervals has increased to 80% in October'15 treatment survey against a baseline of 8.2%. This percentage is maximum among all meat surveys from May'14 to October'15. In contrast, only 51% cattle rearers in the control group purchased deworming in October'15.

Correct practice involves de-worming of cattle every 6 months. The data reflects that de-worming practice among BGMs has been good enough and the increasing trend of this practice is a very positive sign of impact of project intervention.

95% of all 850 BGMs surveyed in meat producer treatment surveys from May'14 to October'15 purchased de-worming services at least once. 73% bulls surveyed and 77% bulls sold were provided with deworming at any point during their rearing cycle.

Vaccination

The following table shows the percentage of cattle rearers in both treatment and control group purchasing³ any vaccination in the last 6 months.

Table 7: % of BGMs purchasing any vaccination for bulls during the last 6 months

INDICATOR	Baseline December 2012	Treatment Survey August 2015	Treatment Survey October 2015	Control Survey October 2015
% BGMs purchasing any vaccination for bulls during the last 6 months	2.0%	23.3%	58.0%	2.5%

The purchase of any type of vaccination by BGMs has increased to its maximum of 58.0% in October'15 treatment survey, compared to the baseline of only 2.0% in December'12 baseline survey. In contrast, the purchase of vaccination has been decreased among control group members from August'15 survey. Only 2.5% cattle rearers purchased vaccination in the control group according to October'15 control survey.

Among a total of 850 BGMs surveyed in meat producer treatment surveys from May'14 to October'15, 60% BGMs purchased vaccination services at least once. 32% of bulls surveyed and 24% of bulls sold were provided with vaccination at any point during their rearing cycle.

The following graph demonstrates purchasing practices of vaccination by treatment and control group members over period of time compared to the baseline:

³ Ideally, the cattle rearers are supposed to purchase the vaccines themselves. However, due to project interventions, some BGMs currently receive vaccinations for free. Therefore, the indicator reports the incidence of use instead of purchase only.

Figure 7: % BGMs purchased any vaccination for bulls during the last 6 months

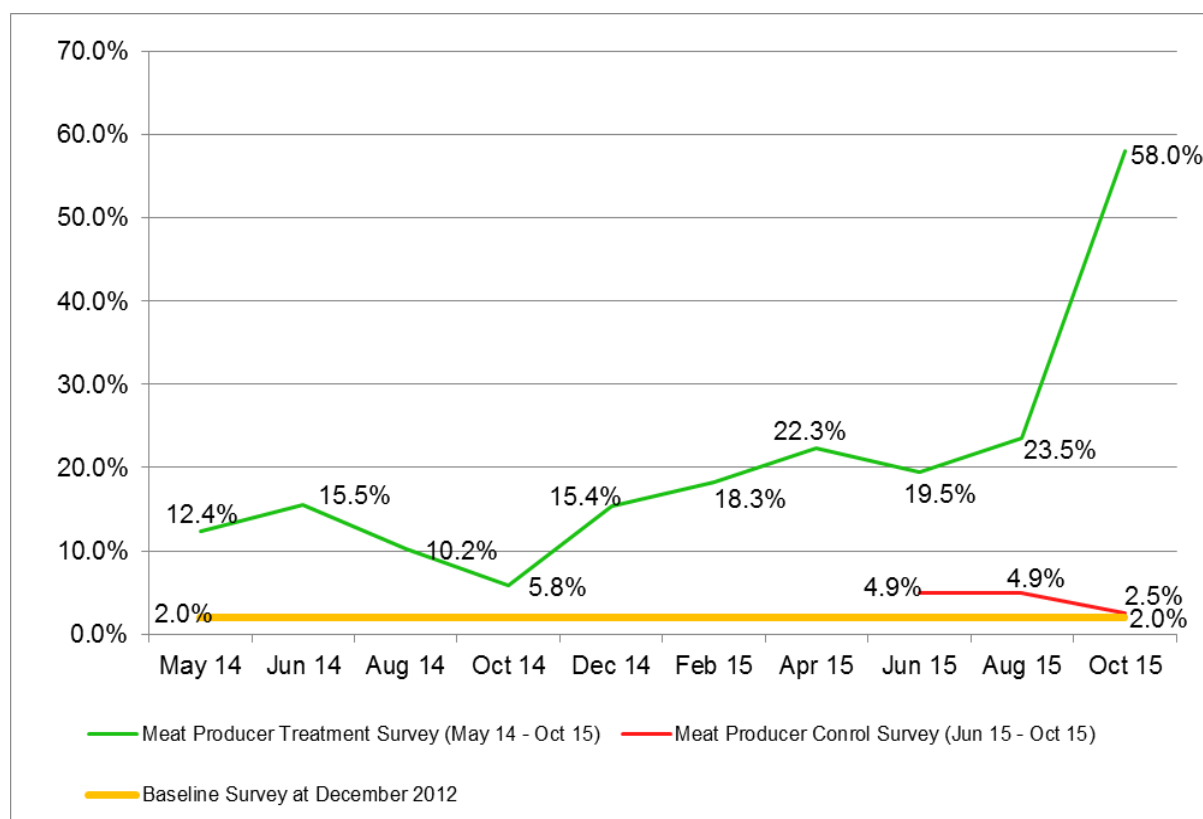


Table 8 provides a breakdown of the percentages of bulls vaccinated against key cattle diseases, at appropriate intervals as of October'15 survey data. Correct practice involves vaccinating cattle against Black Quarter (BQ) and Foot and Mouth Disease (FMD) every six months and against Haemorrhagic Septicaemia (HS) and Anthrax every 12 months. The table demonstrates that significant changes has been achieved in October'15 among BGMs regarding vaccination practices, compared to August'15 treatment survey. However, more improvements in awareness level of BGMs are still required, if all cattle are to be vaccinated with sufficient frequency.

Table 8: % of bulls vaccinated against key cattle diseases in the correct interval

INDICATOR	Baseline December 2012	Treatment Survey August 2015	Treatment Survey October 2015	Control Survey October 2015
% of bulls vaccinated against foot and mouth disease in the last 6 months	No data	7.8%	10.0%	0%
% of bulls vaccinated against anthrax in the last 12 months	No data	9.1%	23.9%	-
% of bulls vaccinated against black quarter in the last 6 months	No data	5.5%	7.6%	0%

% of bulls vaccinated against haemorrhagic septicaemia in the last 12 months	No data	2.0%	5.3%	-
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Significant increase in the percentage of bulls vaccinated to prevent major diseases like Anthrax (23%) and FMD (10.0%) reflect the increased awareness and practices by BGMs.. Percentages of bulls vaccinated to prevent BQ disease and HS diseases also have been increased by 2.1 percentage points and 3.3 percentage points respectively in October'15 treatment survey. Whereas, no bull in control group has been vaccinated for any of the diseases

3. Production and productivity

3.1 Rearing cycle length

The project has been promoting a beef fattening business model which involves fattening cattle intensively for shorter periods of time (2 to 4 months). This model is more profitable than rearing for longer cycles due to the possibility of a higher financial turnover.

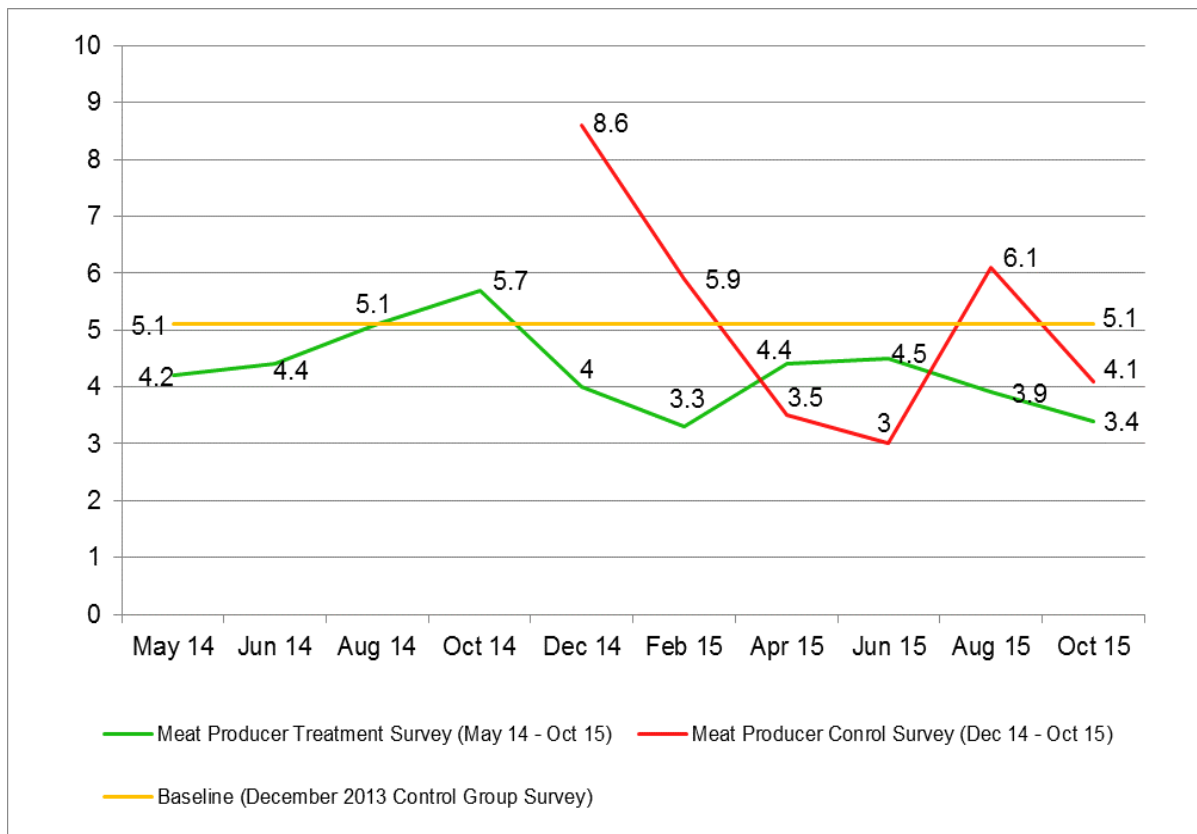
Table 9: Average length of rearing cycle for bulls (months)

INDICATOR	Baseline December 2013	Treatment Survey August 2015	Treatment Survey October 2015	Control Survey October 2015
Average length of rearing cycle for bulls (months)	5.1	3.9	3.4	4.1

Among the BGMs that sold cattle in survey period, the average length of rearing cycle per cattle has decreased to 3.4 months in October'15 treatment survey, compared to 3.9 months in August'15 treatment survey, 5.1 months in baseline of 2013 and 4.1 months in the control group in October'15 control survey. It is clear that treatment group members have had very good rearing cycle which ultimately resulted in more profit by treatment group members (i.e. BGMs) in October'15.

The following graph reports rearing cycle of cattle by treatment and control group members over period of time compared to the baseline:

Figure 8: Average length of rearing cycle for cattle (months)



The above figure shows that the trend of average rearing cycle is consistently better in treatment group business group members, compared to the members in control group as well as in baseline.

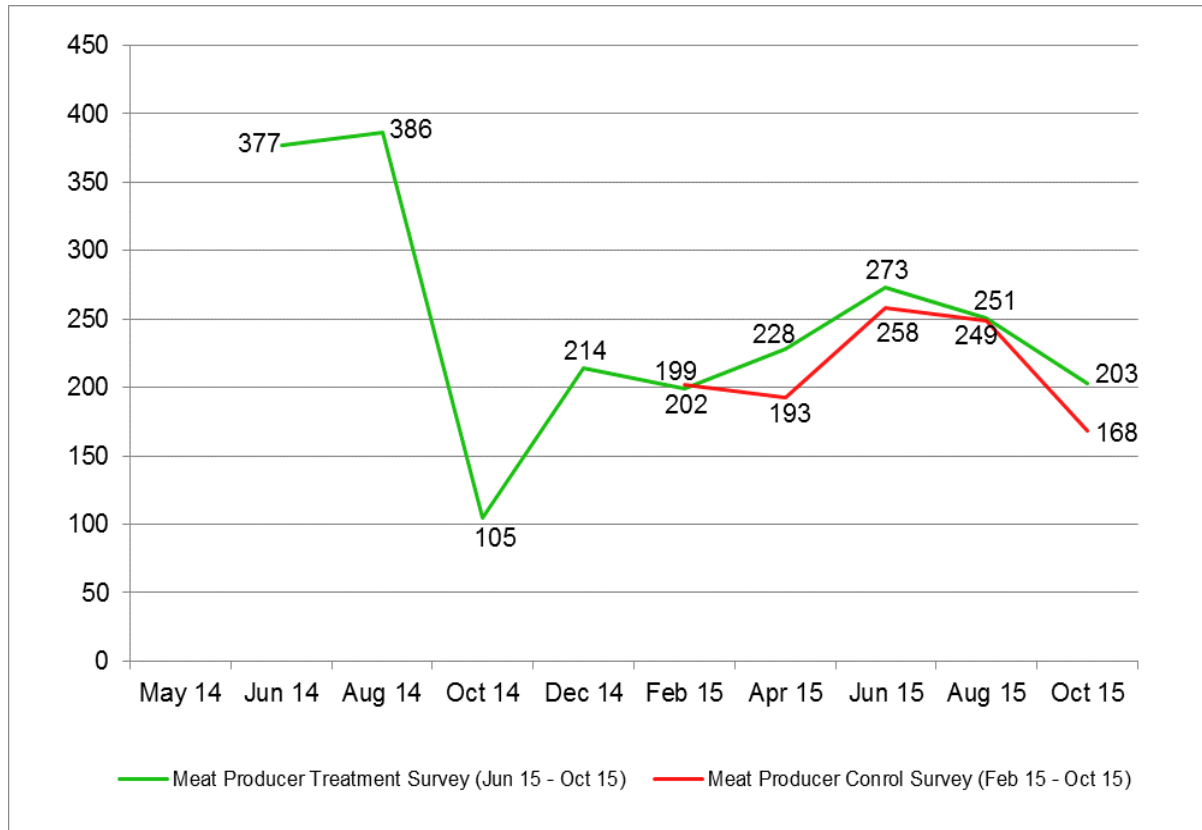
3.2 Body weight gain

Measuring body weight gain of cattle requires availability of cattle during the survey. This limits the extent to which productivity gain can be measured accurately. Additionally, it requires the data to be available for two consecutive surveys. It is very probable that the cattle which already have been sold have gone through proper improved diet before selling and they might have gained much more weight compared to remaining cattle. Hence, some very positive data regarding body weight gain is lost systematically. The calculation of body weight gain has been possible only for the cattle which were available in last two surveys.

Figure 8 shows that the mean body weight gain per head of cattle per day (the daily live weight gain - DLWG) has been 203 gram in October'15 treatment survey, compared to 251 gram in August'15 survey in treatment group. The mean body weight gain in control group cattle has been 168 gram per cattle per day in October'15 control survey. DLWG of cattle is critical towards increasing the financial turnover/number of sales of cattle within any 12 months period of time, and towards the profitability of beef fattening as a business.

The following graph reflects average body weight gain by treatment and control group cattle in consecutive surveys:

Figure 9: Mean body weight gain per head of cattle per day (gram)



Current body weight gain measurement system requires 2 weight measurements of same cattle in 2 successive surveys. Hence over the 10 meat surveys in last 20 months, it is highly probable that we have missed the body weight gain data for the most potential bulls which were surveyed in previous survey, but already sold within next 2 months before survey starts. Those bulls were supposed to gain maximum weight in last 2 months of their rearing cycle; since the maximum amount of improved diet is provided to the cattle just before sale.

4. Sales and profits

4.1 Mean profit per head of cattle per month

Table 10 presents mean profit per head of cattle per month against the baseline December 2012 survey. It is important to consider that the methodology for the data collection of the December 2012 survey is likely to have resulted in a moderate inflation of the baseline profit figures. Specifically, estimated current value minus expenditure to date was used to calculate profit. In reality, these farmers had not sold their cattle at this point and many will have continued to rear their cattle for several months more. Rearing for longer periods reduces the profit per head of cattle per month significantly. It would not be accurate to estimate the inflation caused as a result, because the information required doing this accurately is not available, but it is important to bear in mind when comparing subsequent monitoring data against this baseline.

Among the 802 BGMs surveyed in October'15 meat treatment survey, 35% BGMs (279) have sold a number of 350 cattle during the survey period. And among 99 member surveyed in October'15 control survey, 38% members have sold a number of 43 cattle during the survey period.

Mean profit per cattle per month by BGMs has increased to 2,564 Taka per cattle per month in October'15, compared to 1,387 Taka in the baseline and 1,551 Taka in August'15 treatment survey. In October'15 control survey, profit per cattle per month in the control group has been 1,624 Taka per cattle per month only.

Table 10: Mean profit per head of cattle per month

INDICATOR	Baseline December 2012	Treatment Survey August 2015	Treatment Survey October 2015	Control Survey October 2015
Mean profit per head of cattle per month (Taka)	1,387	1,551	2,564	1,624

Among 279 BGMs who have sold cattle in October 2015 treatment survey, 22 BGMs (8%) have experienced loss from selling a number of 24 cattle (7%) among total 350 cattle sold by BGMs in October'15 survey period. The reasons of the losses include- sickness (15 cattle), leasing (6 cattle), larger cost of input (2 cattle) and selling cattle for the marriage ceremony of daughter (1 cattle).

The highest mean profit per cattle per month has been 21,264 Taka and the lowest mean profit per cattle per month has been -3,093 Taka in October'15 treatment survey. If we exclude the most extreme values i.e. 5 highest profits and 5 lowest profits from the profit data, the mean profit per cattle per month at October'5 treatment survey becomes 2,389 Taka.

Considering the average (mean) profit at household level, the mean profit per HH (i.e. BGM) per month (among the total reared months in one year) has been 3,216 Taka for the 279 BGMs who have sold cattle at October'15 treatment survey period. Comparing with last one year HH profit - a number of 599 BGMs sold cattle during Dec'14-Oct'15 survey period and the mean profit per HH per month has been 3,544 Taka for last one year duration which includes the Eid-ul-Azha sale during October'15 survey period.

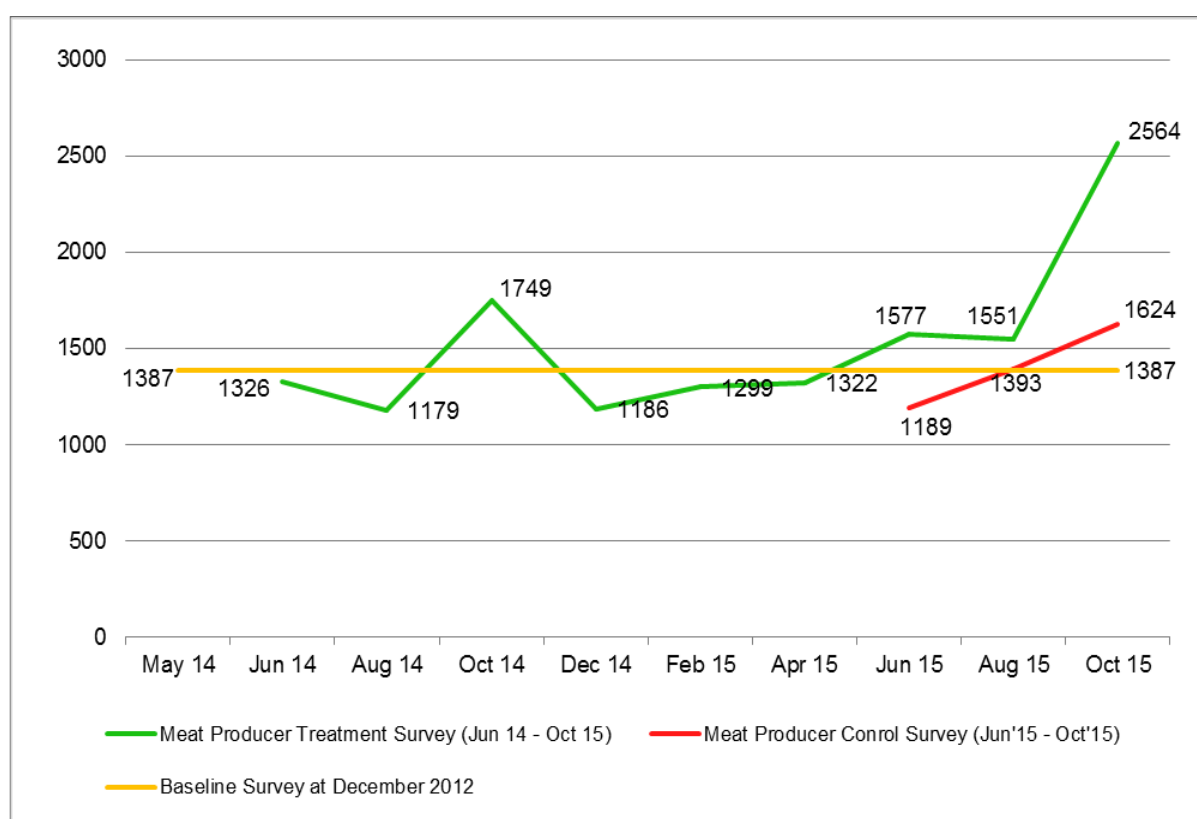
Table 11: Comparison of distribution of average (mean) HH profit per month between Oct'15 Survey and Dec'14 - Oct'15 Surveys

Average HH profit per month (Taka)	October 2015 Survey (Aug'15 - Oct'15 period)			December 14 – October 15 Surveys (Oct'14 - Oct'15 period)		
	Number of BGMs/HHs	Percent of BGMs	Cumulative Percent	Number of BGMs/HHs	Percent of BGMs	Cumulative Percent
< 0	21	7.5%	7.5%	23	3.8%	3.8%
0 - 500	24	8.6%	16.1%	55	9.2%	13.0%
500 - 1,000	43	15.4%	31.5%	76	12.7%	25.7%
1,000 - 3,000	110	39.4%	71.0%	243	40.6%	66.3%
3,000 - 5,000	29	10.4%	81.4%	82	13.7%	80.0%
5,000 - 10,000	34	12.2%	93.5%	81	13.5%	93.5%
>=10,000	18	6.5%	100.0%	39	6.5%	100.0%
Total	279	100.0%		599	100.0%	

The above table shows that most of the BGMs have gained average profit of 1000-3000 Taka per month both in October'15 survey (39.4%) and last 6 surveys (40.6%) from December 2014 – October 2015. Among the BGMs who sold bulls, 6.5% BGMs have gained average profit greater than or equal to 10,000 Taka. Although October'15 survey covered Eid-ul-Azha sale, the distribution of profits by BGMs in last one year survey period (Dec'14 to Oct'15) are much similar to October'15 survey period; that reflects similar trend of profit making by BGMs all the year round.

The following graph shows the mean profit per cattle per month by treatment and control group members over period of 20 months compared to the baseline. The highest mean profit made by BGMs has been observed in October'15 treatment survey.

Figure 10: Average profit per head of cattle per month (Taka)



In against of the target of 1st milestone for Integrated Meat and Fodder Market Development (IMFP) project under Outcome Indicator 5 (CLP Market Development Logframe) “50% profit increase over baseline” has been achieved by BGMs in October 2015. The target was that BGMs would gain average profit of 2,081 Taka per cattle per month within January 2016. But, in against of the target for 2nd milestone of “50% of members will show a 50% profit increase over baseline”, 44% BGMs have achieved the target at October’15, i.e. 88% of the target of number of BGMs has been achieved.

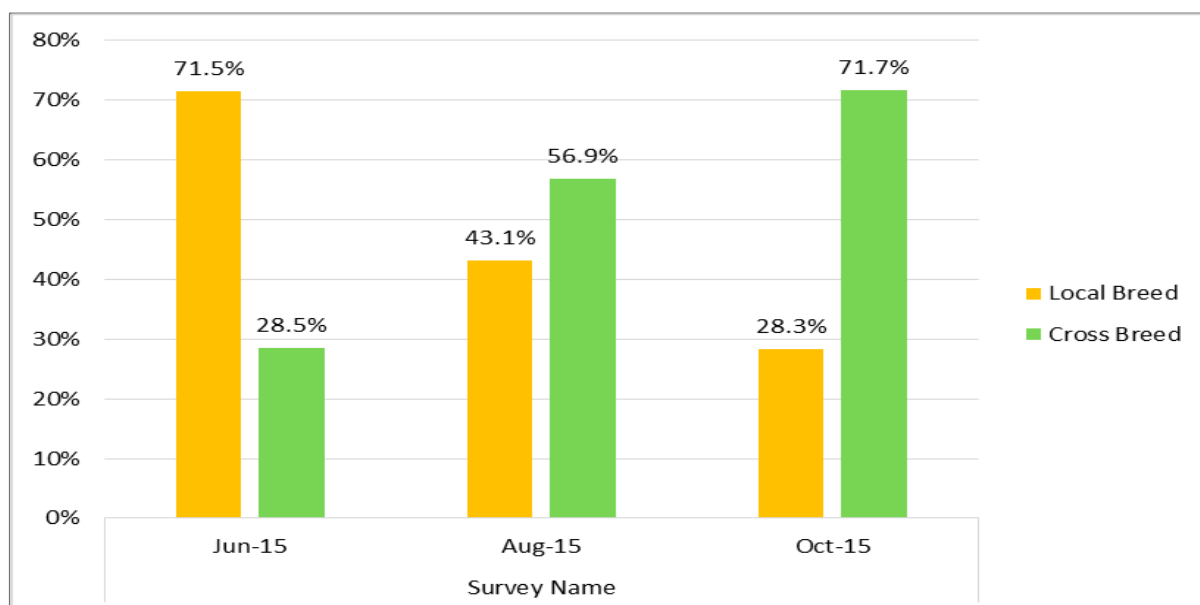
Table 12: Progress of Outcome Indicator 5 toward January 2016 milestone

INDICATOR	Baseline December 2012	Milestone January 2016	Achievement as of October 2015	Progress toward Milestone (%)
Mean profit per head of cattle per month	1387	2081	2564	123%
% of BGMs achieving a 50% profit increase over the year	NA	50%	44%	88%

Reasons behind higher profit in October 2015 treatment survey:

1. One of the main reasons for significantly higher profit by BGMs in October’15 meat survey was the highest percentage of cross breed sold cattle (71.7%) having double mean profit (2,999 Taka), compared to lower mean profit (1,459 Taka) with only 28.3% local breed sold cattle. The percentage of cross breed bulls sold increased significantly from Jun’15 survey. The percentage distributions of breed of bulls sold by the BGMs in last 3 consecutive surveys is presented in the following figure:

Figure 11: Percentage distribution of breed of bulls sold during Jun’15-Oct’15 surveys



The above graph shows that the percentage of bulls sold during June’15 survey period was 28.5% which gradually has increased and reached its maximum of 71.7% in October’15 meat treatment survey.

2. Another important reason was that the price of sacrificial animals got very high at Eid-ul-Azha as the demand of local cattle was increased amid a fall in supply of cattle from India. The Indian authorities took tough stances to check smuggling of cattle into Bangladesh during the survey period. Hence, the demand for local cows increased significantly that pushed up the prices of bulls in the local markets (Source: The Daily Sun online).
3. Besides, significant improvements occurred in adopting cattle rearing practices by BGMs like purchasing and usage of ready feed for their cattle by 68% BGMs, purchasing deworming services by 80% BGMs and purchasing vaccination services by 58% BGMs during October'15 survey period have contributed to the significantly increased profit gain by BGMs.

4.2 Factors affecting profits by BGMs

Some statistical tests have been conducted to explore whether there is any association between profit per cattle per month⁴ (Taka) and some other factors that were important considerations of intervention of Integrated Meat and Fodder Market Development Project (IMFP). Some qualitative data has been collected through discussion with IMFP staffs to understand the difference of mean profit among the categories of the selected factors. These in-depth analysis into the profit data has revealed few interesting findings. The summary of these results are following:

1) Profit from different breed of bulls: (Jun'15 - Oct'15 surveys)

Table 13: Mean profit per cattle per month according to breed of bulls sold during June 2015 – October 2015 survey period

Breed of Bulls	Number of Bulls Sold	Mean Profit (Taka)
Cross Breed	345	2,471
Local Breed	270	1,438
Total	615	2,017

The above table shows that the mean profit of cross breed cattle is much higher (2,471 Taka), compared to that of the local breed cattle (1,438 Taka). Significant difference has been found between mean profit for cross breed and local breed bulls using independent samples t-test, $t(613) = 5.83$, $p < 0.001$. The result from the analysis reflects the fact that more profit can be made from rearing cross breed cattle. Cross-breed bulls grows faster than local breed cattle. If it is provided with balanced diet, it may grow 2-3 times faster. To reduce poverty, rearing cross-bred bulls is considered as one of the best practices of cattle rearing⁵.

⁴ The estimation of mean profit per cattle per month was inflated due to analysis procedure for the cattle reared less than one month period having both positive and negative profit; hence inflated profit data for rearing cycle < 0.9 months were excluded from analysis.

⁵ Technical hand note on small scale commercial beef farming, CMDI/IMFP project, reviewed by Dr. Mohammad Habibur Rahman, Professor, Pathology Department, Bangladesh Agricultural University, Mymensing; Dr. M.A. Latif, District Livestock Officer, Gaibandha and Dr. Md.Shafiul Alam, Upazilla Livestock Officer, Bogra Sadar, Bogra.

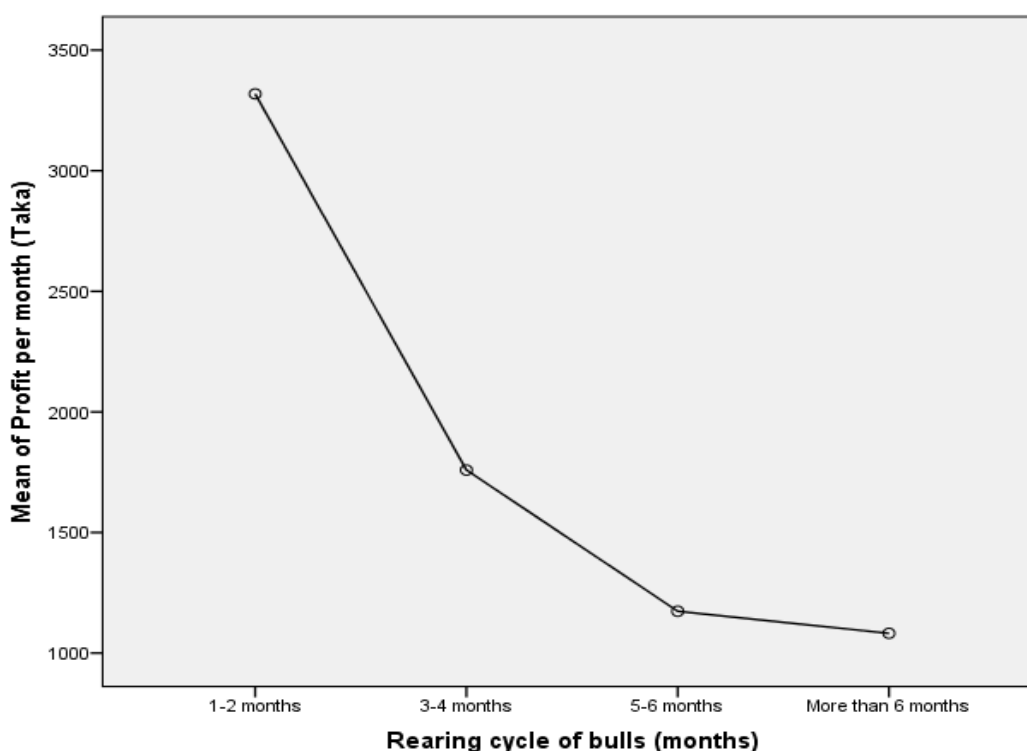
2) Profit at different rearing cycles: (Dec'14 - Oct'15 surveys)

Table 14: Mean profit per head of cattle per month according to the rearing cycle of bulls sold during December 2014 – October 2015 survey period

Rearing Cycle of Bulls	Number of Bulls sold	Mean Profit (Taka)
1-2 months	211	3,319
3-4 months	198	1,759
5-6 months	162	1,174
More than 6 months	445	1,082
Total	1016	1,693

The highest profit per cattle per month (3,319 Taka) has been gained by BGMs from selling bulls having 1-2 months' rearing cycle and the 2nd highest profit (1,759 Taka) has been gained for 3-4 months' rearing cycle bulls. As the rearing cycle increased, mean profit per cattle per month decreased. An independent samples one-way analysis of variance (ANOVA) showed that there is significant difference of mean profit across different rearing cycles of bulls, $F(3, 1012) = 81.81, p < 0.001$.

Figure 12: Mean profit by of rearing cycle of bulls sold during Jun'15-Oct'15 surveys



The above table shows that the mean profit per cattle per month has been highest (3319 Taka) for the lowest (1-2 months) rearing cycle's cattle group. As rearing cycle increased, mean profit per cattle per month decreased simultaneously.

2) Profit from bulls at different age group: (Dec'14 - Oct'15 surveys)

Table 15: Mean profit per head of cattle per month according to age group of bulls sold during December 2014 – October 2015 survey period

Age Group of Bulls	Number of Bulls sold	Mean Profit (Taka)
Up to 12 months	58	1,158
13-18 months	132	1,154
19-24 months	248	1,654
25-30 months	305	1,866
31-36 months	188	1,935
More than 36 months	85	1,852
Total	1016	1,693

The above graph shows that BGMs has gained maximum profit (1,935 Taka) from the 31-36 months' aged sold cattle. The 2nd highest profit (1,866 Taka) has been gained from the cattle aged 25-30 months. An independent samples one-way analysis of variance (ANOVA) showed that there is significant difference of mean profit across different age group of bulls $F(5, 1010) = 4.06, p < 0.005$.

4) Profit by different Districts of Intervention Area: (Dec'14 - Oct'15 surveys)

The highest profit per cattle per month was gained by BGMs at Sirajganj district (3,255 Taka). The second highest profit was 2,646 Taka at Pabna district and the lowest mean HH profit was experienced by Rangpur district (995 Taka). The main reason of higher profit is the distance of main cattle market (haat) of capital city (Dhaka) from the respective Districts. The distance⁶ of Sirajganj and Pabna Districts from Dhaka (zero point) are 134 Km and 216 Km respectively, which are the lowest among 6 Districts of working areas of the project. The lower distance made it easier the transportation of cattle from the higher performing districts to the main cattle market in Dhaka district. Besides, the price of meat in the local market of Sirajganj and Pabna districts are 30-40 Taka per KG higher than that of other districts of project areas. Most importantly, the BGMs of Pabna and Sirajganj are more knowledgeable on cattle rearing practices.

Table 16: Mean profit per head of cattle per month by intervention area (Districts)

Districts	Number of Bulls sold	Mean Profit (Taka)
Bogra	108	1,384
Gaibandha	84	1,692
Kurigram	417	1,414
Pabna	97	2,646
Rangpur	189	996
Sirajganj	121	3,255
Total	1016	1,693

An independent samples one-way analysis of variance (ANOVA) showed that there is significant difference of mean profit across different districts, $F(5, 1010) = 30.61, p < 0.001$.

⁶Distance Matrix (From District HQ to District HQ), Roads and Highways Department, Ministry of Communications, Government of the People's Republic of Bangladesh.

5. Conclusion

The report presents a review of bi-monthly progress in different outcome indicators as well as a comparison with the control group. It also demonstrates the progress achieved by the project over the last 20 months.

Percentage of BGMs purchasing ready feed reached its maximum of 68% in October'15 treatment survey, compared to all other previous treatment surveys. Besides, the mean amount of ready feed provided per cattle per day has increased to 579 gram in October'15 treatment survey.

Although the percentage of BGMs purchasing Napier and/or Jumbo grass in the last 2 months has increased by only 1 percentage point (2.3%) from August'15 survey, it has been coincided with cultivation of Jumbo and/or Napier grass (by 31% BGMs) in the last 12 months. Besides, most of the BGMs (79%) consider that feeding Jumbo or Napier to their cattle is very effective measure for beef fattening.

Average length of rearing cycle for bulls has decreased to 3.4 months in October'15 treatment survey - fulfilling the expectation of the project. The percentage of cross-breed bulls reared by BGMs has increased to 61.0% during reporting period, which is also a good sign of project interventions.

The percentage of BGMs purchasing deworming tablets for their cattle in last 6 months increased to its maximum of 80% in October'15 treatment survey. Parallel to de-worming, the percentage of BGMs purchasing vaccination in last 6 months also reached its maximum of 58.0% in October'15 survey.

The mean profit per cattle per month has been 2,564 Taka per head of cattle per month in October'15 and exceeded the 1st milestone of "50% profit increase over baseline". But, in against of the target for 2nd milestone of "50% of members will show a 50% profit increase over baseline", 44% BGMs have achieved the target at October'15, i.e. 88% of target of BGMs has been achieved.

Most of the 350 sold cattle in October'15 has been cross breed (71.7%). The mean profit per cattle per month has been double i.e. 2,999 Taka for cross breed cattle, compared to mean profit of 1,459 Taka for local breed cattle in October'15 treatment survey.

BGMs in treatment group have steadily performed very well compared to their counterpart in the control group for all indicators due to intervention of Integrated Meat and Fodder Market Development (IMFP) project over the 20 months' survey period. Very significant improvement by BGMs has been observed for all indicators in October'15 survey period. Increased percentage of BGMs in purchasing ready feed, deworming, and vaccination; in cultivating Napier and/or Jumbo grass; and in adopting increased percentage of cross breed bulls and decreased length of rearing cycle jointly have contributed to significantly increased amount of mean profit by BGMs compared to members both in control group survey and baseline survey.

6. Annex: Summary of performance against key indicators

INDICATOR	Baseline	May 2014 Survey	June 2014 Survey	August 2014 Survey	October 2014 Survey	December 2014 Survey	February 2015 Survey	April 2015 Survey	June 2015 Survey	August 2015 Survey	Oct 2015 Survey
% BGMs purchasing Napier and/or Jumbo grass in the last 2 months	1.3%	0%	1.7%	1.0%	4.3%	0.7%	1.1%	8.2%	2.3	2.2%	2.3
% BGMs cultivating Napier and/or Jumbo grass in the last 12 months	NA	-	-	-	18%	28%	27%	32%	33%	33%	31%
% BGMs purchasing ready feed in the last 2 months	9.9%	42%	44%	38%	48% ¹	34%	46%	51%	47%	60%	68%
Mean quantity (gm) of ready feed provided per head of cattle per day	244	835	567	378	485	347 ²	369	439	489	423	579
% of bulls reared which are cross-breed	7.3%	9.3%	7.6%	6.9%	6.7%	6.7%	8.2%	30.7% ³	44.3%	56.2%	61.0%
% BGMs purchasing deworming tablets for bulls during the last 6 months	8.2%	45%	75%	80%	57%	61%	63%	69%	68%	77%	80%
% BGMs purchasing any vaccination for bulls during the last 6 months	2.0%	12.4%	15.5%	10.2%	5.8%	15.4%	18.3%	22.3%	19.5%	23.3%	58.0%
Average length of rearing cycle for bulls (months)	5.1	4.2	4.4	5.1	5.7	4.0	3.3	4.4	4.5	3.9	3.4
Mean body weight gain (gm) per head of cattle per day	300	NA	377	386	105	214	199	228	273	251	203
Mean profit per head of cattle per month (taka)	1387	NA	1326	1179	1749	1186	1299	1323	1577	1551	2564

¹ This is being calculated for the BGMs having eligible bulls only (local breed - 15 months or more and cross breed - 12 months or more) since October'14.

² This is being calculated for the eligible bulls only (local breed - 15 months or more and cross breed - 12 months or more) since December'14 survey.

³ The method for Identifying cross breed bulls was improved since April'15 as suggested by livestock expert.