



## **On farm Demonstration of Improved management of F1 cow for farmers around Meki area of Oromiya region, Ethiopia**

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### **Abstract**

Demonstration of F1 cows was done with farmer's research group (FRG) comprising of eight participating farmers in Bekele Gressa kebele of Dugda district. The distribution was done when they were 7 month pregnant heifers, with the objective of improving farmer's livelihood through improving milk production. Training was delivered to the participating farmers on how to feed and manage the cross bred cows. The result of the survey conducted before the commencement of the demonstration activity indicated that the average milk yield of local cattle in the study area was  $1.06 \pm 0.15$ lt /cow/day. The on farm average milk yield for the F1 demonstrated crossbred cattle in the study area was found to be  $6.55 \pm 0.048$ lt / cow/day for the year 2016 and  $6.59 \pm 0.06$ lt /cow/day for the year 2017 respectively. This in turn had positive impact on the income diversification and fulfilling protein requirement of the household, finally improved livelihood.

**Keywords:** farmers research group, pregnant heifers, on farm and demonstration

### **Introduction**

Ethiopia, despite its large livestock resource base (99.4% indigenous and the rest crossbreds) and an ecological setting suitable for dairy production, is not yet self-sufficient in milk production (FAOSTAT, 2010). As a consequence, the per capita milk consumption appears to have declined from 26 liters per annum in 1980 to 16 liters in 2008 which ranked Ethiopia one of the least in the world (Zegeye et al., 2003; Azage et al., 2006; ELDMPS, 2007; FAOSTAT, 2010).

Livestock productivity in Ethiopia is said to be poor due to a number of reasons among which low genetic capacity of indigenous cattle is one (Mukasa Mugerewa, 1989). In Ethiopia, poor genetic potential for productive traits, substandard feeding, poor health

care and management practices, are the main contributors to low productivity (Zegeye et al., 2003). In order to improve the low productivity of local cattle, selection of the most promising indigenous breed or breeds and crossbreeding with high producing exotic cattle has been considered as a practical solution (Tadesse, 2002). Study conducted in North Shoa zone indicated that 50% cross breeds produce more amount of milk (1511.5 L) than local breeds (457.89 L) per lactation (Mulugeta and Belayneh, 2013). Belay et al. (2012) reported that mean milk production per lactation from Horro and Holstein Friesian cross was 2333.63 L. This could be either due to complementary or heterosis effect to the achievable environment.

Available information indicates that the productive and reproductive performance of indigenous cattle breeds is low (Addisu.2013) However, information on the actual potential of indigenous breed(s) is not satisfactory due mainly to the absence of recording system. Attempts so far done at on farm condition in the mid-rift valley of east shoa zone and elsewhere in the country to improve the performance of indigenous breed through crossbreeding indicated an encouraging result in improving milk yield and growth rate. Though the demand for F1 crossbred dairy cows was high it was not a simple task to fill this demand in the past but recently the government is applying on farm production through synchronization. This activity therefore, was designed to demonstrate the F1 cross bred animals to the farmers with the objective of increasing farm gate milk production through provision of improved cross bred animals and their management packages and Improve the income of the farmers through improved milk production

## Materials and Methods

### Description of the Area

The study was conducted in Gressa kebele near Meki town, East Shoa Zone of Oromia regional state Gressa Kebele is located on the main road from Addis Ababa to Hawassa at a distance of 137 km, and elevation of 1664.88 meters above sea level (masl) with coordinates of 8°9'18.69"N and 38°49'32.79"E (www.distancesto.com) The area gets about 64% of annual rainfall from June to September. Its mean annual temperature is 20.3°C while average annual precipitation is 774 mm. The air relative humidity of the study area is 66% on average (JICA, 2002). The Area is irrigation based horticulture producing rural villages.

### Farmers Selection

Farmer selection was done based on the information collected from the woreda experts, development agents (DAs) and the discussion held with the kebele farmers. Relatively poor farmers were selected to observe the impact of the F1 dairy cow on the livelihood of the farmers. The selection criteria used to identify the farmers

- Willingness of the farmer
- Possession of adequate land for the cow management
- Number of family members (the larger the better)

- Relatively low income so that the impact of having cross bred on the livelihood could be pointed out simply
- Previous experience on dairy cow management
- Willingness to manage the cross bred dairy cow as per the instruction of the researcher
- Experience on saving money so that they could repay the purchase price
- Commitment to sale the second F1 heifer to the neighboring small holder farmer as a means of scaling up activity

### Animal purchase and technical training

The activity was done in Girissa kebele of Dugda District (one of the AGP II districts) in East Shoa zone. Eight F1 pregnant heifers were sold to the farmers with subsidized price from ATARC (Adami Tullu Agricultural Research Center) in the kebele to see the performance of the F1 dairy heifers with improved management practice in the mentioned kebele. The cost was totally covered by the farmers themselves.

Training was given to all participating farmers, DA, expertise of the respective district stakeholders and other concerned bodies. The areas of training were on how to improve productivity of cross bred cattle, management system. Advantages and disadvantages of genetic improvement for higher milk production and the contribution of record keeping and animal identification were also addressed.

### Supplementary feeds

Noug cake was purchased by AGP II project funding and wheat bran and salt was purchased by the farmers to be used as supplemental feed on farm. After formulation of the feed based on maintenance and production requirement the supplemental feed mix up was done on farm in collaboration with the farmers and delivered to the F1 cows. Four of the five lactating F1 cows were used as experimental animal in a feeding trial conducted in and around meki town through another project in 2016. Two supplemental feed were used in the experiment formulated of locally available feed namely linseed cake, wheat bran and molasses in the first group and cotton seed cake Atela (local brewery) and wheat bran in the second group.

### Data collected

Data regarding milk yield, type of feed, milking practice, conventional management system, and price of supplemental feed, medicament and all cost related to F1 were collected.

### Partial budget Analysis

The partial budget analysis was calculated to compare the benefit F1 cows as compared to the local cows under on farm management conditions. Some of the costs like herding and grazing (basal diet) are considered to be uniform for both F1 and local cattle so it is not considered. But All the supplemental feed cost and medicament were included in the partial budget. According to (Ehui et al. 1992) Net income (NI) was calculated as the amount of money left when total variable cost (TVC) was subtracted from total returns (TR). In this experiment the variable costs included purchase of supplemental feed and cost for medicaments. While total return (TR) was estimated by the selling price of the Average milk yield selling price of 1lt of milk which was 15 birr during of the experimental period. Therefore a formula of  $NI = TR - TVC$  was used for the calculation of profitability.

### Baseline data collection

Baseline information on the socioeconomic status of the participating farmer was collected before the distribution of the animals to the farmers.

### Results and Discussion

The baseline data indicated that education status of the respondents was about 50%, 33.3% and 16.7% of the farmers were illiterate, got elementary school and got high school study, respectively. House hold source of income comprised of crop-livestock production 66.8%, while the rest did additional work over the crop-livestock production like daily labor (16.6%) and government employment (16.6%) as their off farming activity.

Average milk yield of local cow per head per day, according to respondent farmers was  $1.06 \pm 0.15$  L. The result is comparable with the finding of (Ketema, 2014) which indicated milk yield of  $1.15 \pm 0.386$  L for local cattle in kersa malima woreda. Slightly lower than the finding of (Yesihak, 2011) reported  $1.99 \pm 0.77$  kg/day for Ogaden breed at Haramaya university.

### Dairy cattle management practice

Regarding the dairy cattle management practice of the area about 50 % of the respondents practice spraying as a means of control for external parasite and about 33% of the respondents practice deepening in naturally existing water containing Mineral rich type of soil immersed in water locally called Bole. All the respondent practice routine vaccination and 83.3 % practice castration bulls at the age between three to four years, and all the respondents use animals' coat color as a means of identification of the individual animal, all the farmers use hand milking. With respect to livestock house the roofing material was categorized as grass (33.4 %), corrugated iron sheet (33.3%) and plastic sheet (33.3%) while the wall material consisted of wood (33.3%) and Mud material (66.7%) and the floor material at the current situation was fully earthen floor.

### Dairy animal feed and feeding practices

There were clear variations among the farmers with respect to supplementation of the animal at hand at the beginning of the experiment. The variation was both in type and amount the supplemental feed. The supplemental feed mentioned includes sole wheat bran (16.7%), wheat bran with Atela (locally brewery) 33.3%, wheat bran and oil seed cake (16.7%) and combination of wheat bran Atella and cake (33.3%). One of the major problems with dairy cattle supplementation in the area was absence of regular supplementation. The frequency of supplementation was as low as twice in a month.

Amount of wheat bran purchased ranged from 25-250 kg per month, while amount linseed purchased ranged from 0-100 kg per month. Price of wheat bran, oil seed cake and Atella according to the farmers were 2.50 birr/kg, 12 birr /kg and 20 birr/20L respectively.

The most common basal diet in the area were crop residue comprising of maize Stover, wheat straw, teff straw and barley straw in addition to lake side grazing and weeds from horticultural fields.

The feeding trial done on four of the eight F1 cows helped the participating farmers obtain practical training on how to feed their dairy cows based on the requirement and their production.

The performance of the F1 cows distributed to the farmers indicated that the average milk yield of the

cross breed animals for the year 2016 was found to be  $6.55 \pm 0.048$  the detailed information is indicated in Table 1 below.

Table 1. Individual farmers and average milk yield of the F1 cows distributed from ATARC through AGPII year 2016

Farmers	Milk yield (mean $\pm$ SE)	N	Standard deviation	Min	Max
Farmer 1	6.75 $\pm$ 0.108	55	0.804	4	8.5
Farmer 2	5.873 $\pm$ 0.055	55	0.410	4.5	6
Farmer 3	6.84 $\pm$ 0.069	55	0.508	6	8
Farmer4	5.87 $\pm$ 0.055	55	0.411	4.5	6
Farmer5	7.39 $\pm$ 0.056	55	0.416	6	8
Total	6.55 $\pm$ 0.048	275	0.794	4	8.5

The performance of the F1 cows distributed to the farmers indicated that the average milk yield of the cross breed animals for the year 2017 was found to be

$6.59 \pm 0.065$ /day/cow the detailed information is indicated in table 2 below

Table 2. Individual farmers and average milk yield of F1 cows distributed from ATARC through AGP II year 2017

Farmers	Milk yield(Mean $\pm$ SE)	N	Standard Deviation	Min	Max
Farmer 1	6.88 $\pm$ 0.122	60	0.93	5	8
Farmer 3	6.53 $\pm$ 0.118	40	0.75	5	8
Farmer 4	5.61 $\pm$ 0.074	59	0.57	5	6.5
Farmer 5	7.32 $\pm$ 0.072	60	0.56	6	8
Total	6.59 $\pm$ 0.065	219	0.97	5	8

The present average milk yield result was  $6.55 \pm 0.048$  L/day/cow and  $6.59 \pm 0.065$  L/day/cow was comparable with the finding of (Asamnew and Eyassu, 2009) average milk yield of 5.2 L in Bahirdar Town for cross bred dairy cattle. And overall average milk yield of  $8.45 \pm 1.23$  L per day per cow was reported (Belay et.al, 2012) from study conducted in Jimma town, but higher than the average milk yield record of ( $4.73 \pm 3.2$  L) for cross bred cows in kersa malima (Ketema 2014). The present results (Table 1 and 2) were lower than the finding of (Adebabay, 2009) which indicated  $10.96 \pm 1.73$  L in Bure district.

Pregnant heifers of similar age and breed were distributed to the famers at the same time. However, because of the variation in breeding management there was great variation in time of calving, some of them calved twice other only once. This might be because some of the farmers were valuing the milk (preferred milking the cow for longer time). This in turn had disrupted the proper time of breeding service.

Intensive training was delivered to the participating farmers on how to feed the animals according to their production and milk yield.

### Financial benefits of milk from F1 cow

The financial advantage of the F1 cows over the local could be calculated in terms of milk yield multiplied by 15 birr/lit of milk taking into consideration of the supplemental feed cost for the F1 and considering zero cost for supplemental feed for local animal. And considering family labor for both types of animals the only variable cost to be considered was feed cost and medicament cost for F1 cows and only medicament cost for local cows,. Accordingly the net benefit of F1 cow was found to be 56.275 birr /cow/day while of the local cow was found to be 9.9 birr/cow/day (Table 3). Moreover cross bred calf produced be it male or female is added benefit for those farmers who had the F1 cows. Additionally the cow dung used for fuel and/or compost making was also an added benefit.

Table 3. Simple Comparison of economic benefit considering only the milk from F1 cow versus Local cow using partial budget analysis

Particulars	F1 cows	Local cow
Lin seed cake cost/cow/day	16 birr	-0
Wheat bran cost /cow/day	15.95 birr	-0
Salt cost /cow/day	0.075 birr	-0
Labor cost /cow/day	(Family labor)	(Family labor)
Medicament cost/cow/day	10 birr	6 birr
Total variable cost (TVC)	41.975 birr	6 birr
Total Return (TR)	6.55lt x 15 birr = 98.25 birr	1.06lt x 15birr = 15.9 birr
Net income (NI)	98.25 birr – 41.975 birr = <b>56.275 birr</b>	15.9 birr – 6 birr = <b>9.9 birr</b>

### Farmer’s opinion

In order to improve the low productivity of local cattle, crossbreeding of these indigenous breed with high producing exotic cattle has been considered as a practical solution (Tadesse, 2002). The present study indicated similar result as that of previous work. The demand of the farmers for the technology is very high. There is continuous request of the farmers for F1 cow. High price and scarcity of F1 cow dictate the request of the farmers. The use of extensive Artificial insemination on local cattle to have cross bred animals at the farm gate could be one means of solving the problem.

### Conclusions and Recommendations

The results of the present study indicated that pregnant heifers distributed to the farmers in Gressa kebele from Adami Tullu Agricultural research center through AGP II project brought significant increase in milk yield per day/cow for the farmers. This in turn had positive impact on the income diversification of the farmers and solved the protein requirement of the house hold, thereby improving the farmer livelihood to some extent.

The use of F1 dairy cows at the on farm level have to be accompanied by the full package management technologies to have optimum milk production one way of achieving this is through practical and intensive training on dairy cow management. Small holder farmers having F1 dairy cows in the study area should have appropriate market linkage both for input supply and sale of milk to have sustainable dairy production and this indicated that the distribution of dairy heifers should be encouraged in

the study areas and in other areas with similar characteristics.

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