SciencePG
Science Publishing Group

Improving Women Farmers' Income Through Organization of Self-help Group and Crossbred Heifers Distribution at Dodola District of West Arsi Zone

Alemayehu Arega[*], Hikma Sultan, Girma Chalchisa

Oromia Agricultural Research Institute (IQQO), Adami Tulu Agricultural Research Center, Batu/Ziwat, Ethiopia

Email address:
fenalex2016@gmail.com (A. Arega)
[*]Corresponding author

Abstract: The study was conducted in Kata Barenda Kebele of Dodola district in West Arsi zone with one FREG comprising of 10 participating women household with relatively lower income. The distribution of 10 in calf heifers done with the objective of improving income of rural women farmers and improving family nutritional balance through distribution of improved F1 in calf heifers and increase milk production. Training and experience sharing was arranged before and after heifer distribution. On average, one household own minimum one (1) with the maximum of three (3) crossbred animals. On average, the current monetary value of calves born form distributed crossbred cows were estimated to be 7571.4± 2636.7ETB. Milk production increased from 1.75±1.21 liter/Cow/day to 6.8±1.47 liter/Cow/day. Milk consumption and sale increased from 1.62±1.31 to 3.1±0.99, 0.72±1.27 to 3.4±0.96 lit/day, respectively. On average one household generated additional 1640 ± 469.51 ETB per month from sale of milk after intervention. They cover their expense for purchasing agricultural inputs, miscellaneous household expenditures and student's school expense from the income generated. Meeting the demand for milk and milk products was the great success for the household after intervention not only meeting family nutrition but also minimizing the cost incurred for purchasing of milk and milk products.

Keywords: F1 Crossbred Heifer, Income, Milk Consumption, Women Farmers

1. Introduction

Ethiopian agriculture is characterized by mixed farming system and the farmers practice both crop production and livestock rearing. Despite its large livestock base (99.4% indigenous and the rest crossbreds) in the country ecological setting suitable for dairy production yet not milk self-sufficient per capita milk consumption decline from 26 liters in 1980 to 16 liters in 2008 per annum [6, 8]. Livestock productivity in Ethiopia is said to be poor due to a number of reasons among which is the low genetic capacity of the indigenous cattle [11].

In order to improve the low productivity of local cattle, selection of the most promising breeds and crossbreeding of indigenous breed with high producing exotic cattle has been considered as a practical solution [12]. The agricultural development led industrialization policy, development strategies and plans of Ethiopia emphasizes the need to bring about rapid agricultural development through the use of improved agricultural technologies (variety/seed/breeds, knowledge, information, management practices, farm equipment, tools, and machine) in a sustainable way as the main means of reducing poverty in the country [2]. This would, however, bring the required impact if it properly addresses the needs of agriculture dependent men, women and young farmers in the rural Ethiopia [3].

Farmers that are involved in seed system are not only men, but also women form a very large integral part of the agricultural activity [4]. Gender analysis indicates that about 88% of the Ethiopian women live in rural areas; nearly 85% of their labour is spent on farming as major sources of livelihood, which includes crop production and animal husbandry [9].

On-farm studies conducted in East Shoa and West Arsi zones indicates that 50% crossbreds (Jersey*Borana; HF*Borana) produce more amount of milk (5.9 to 6.6 liters/cow/day) than local breeds (1.5liters/cow/day) [1]. Currently, there is high gap between the demand and supply of improved dairy cows in the study area in particular and in the country in the general. Therefore, this activity was conducted with the objectives of improving income of rural women farmers and improving family nutritional balance through distribution of improved F1 pregnant heifers and increase milk production.

2. Methodology

2.1. Description of the Area

The study was done in Ketta Berenda Kebele of Dodola District, West Arsi Zone, Oromia National Regional State, Southeastern Ethiopia. Dodola district was one of AGP II District selected for intervention. It is located between 06° 54′20″N and 06° 54′3″N latitude and 39°8′19″E and 39°13′50″E longitude with an elevation ranging from 2490 to 3218 m a.s.l. the average temperature ranges from 3.6 to 24.3°C [5].
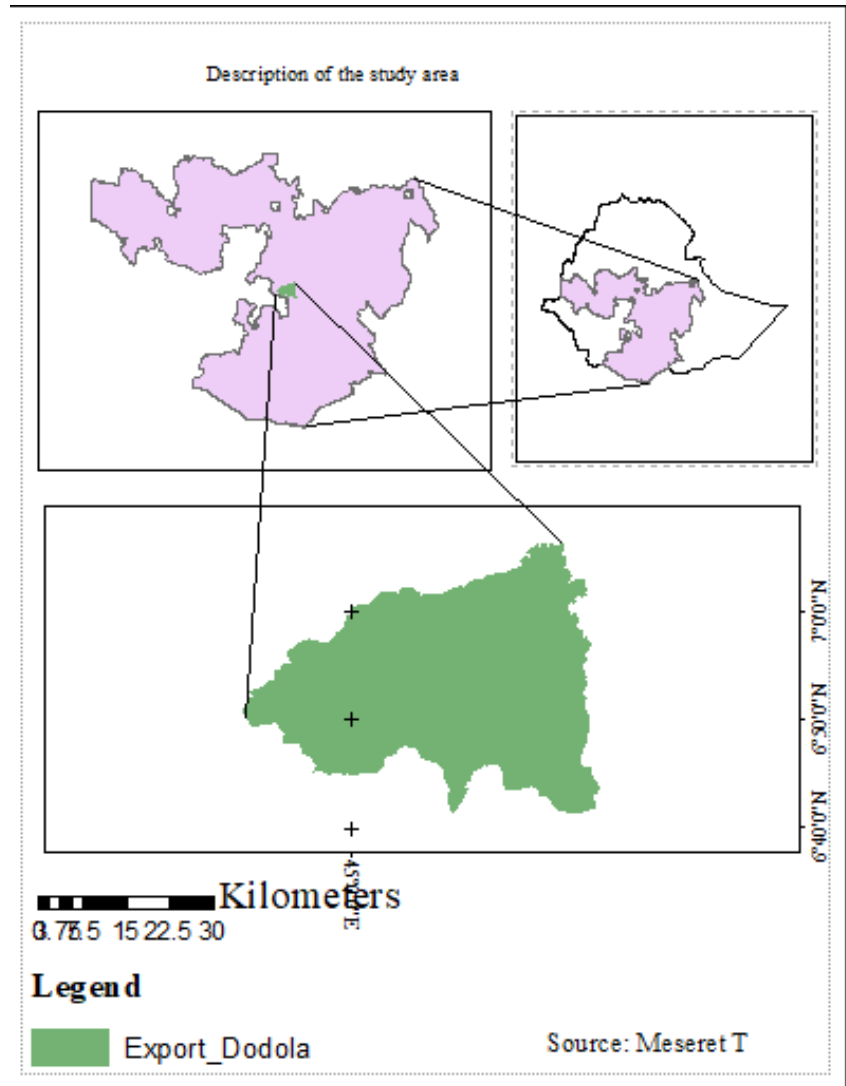

Figure 1. Map of the study area.

2.2. Site and Farmer's Selection

Selection of participant women farmers was done in collaboration with District experts, development gents, Kebele administration and discussion held with the farmers. Checklist was prepared based on the selection criteria prepared and a group of researcher, District experts and Development agent together has a discussion on the criteria and went to the area and fill the checklist efficiently. Then, farmers were selected based on the primary data collected through prepared checklist. A total of 10 farmers with relatively lower income by giving priority for female headed household was selected. One FREG composed of 10 members (all Females) were established.

Selection criteria used to identify the farmers (women farmers)

1) Willingness of the farmer
2) Possession of adequate land for the cow management

3) Number of family members (the larger the better)
4) Relatively low income
5) Previous experience on dairy cow management
6) Willingness to manage the cross bred dairy cow as per the instruction of the researcher

7) Experience on saving money
8) Commitment to not to sale the F1cows till the completion of the project except for the recommendation of the researcher.

2.3. Roles and Responsibility Sharing Among Actors

Table 1. *Stakeholder roles and responsibilities in implementing the activity.*

Stakeholders	Roles and responsibilities
Research (ATARC)	1) Coordination and facilitation 2) Selection and preparation of animals to be distributed 3) Provision of inputs (F1 heifers and bulls, concentrate feeds, Veterinary medicines) 4) Provision of training 5) Organizing field days and visits 6) Supervising, monitoring and Evaluation
Office of Agriculture and Natural resource of the district through Development Agent and assigned Focal persons	1) Organize farmers and assist in site and farmers' selection 2) Monitoring of activities of farmers 3) Support in providing training, field days and visits 4) Assist during distributions of animals 5) Providing animal health service to animals after distribution
Farmers	1) Organize themselves in group 2) Constructing house for animals 3) Paying initial subsidized cost for animals distributed to them 4) Producing and purchasing additional feed for animals, keeping and managing their animals as per researchers recommendation 5) Data recording 6) Participate in the training field days 7) Share skills and experiences to neighboring farmers

2.4. Experimental Animal Preparation and Distribution

Ten F1 Crossbred heifers (HFXA) were selected and inseminated from the nucleus herd at ATARC. After they were confirmed to be pregnancy positive the pregnant heifers were distributed to ten (10) selected farmer's individual by lottery method. Heifers were provided with subsidized price form the center. In addition to heifers, one (1) F1 crossbred breeding bulls distributed to the group to alleviate the problem of Artificial Insemination service and Inbreeding problem in the area. The distribution of heifers was done in presence of different stakeholders higher officials from Oromia Agricultural research Institute, West Arsi zone Agriculture and Livestock development office, Dodola District Administrative and the distribution get Media Coverage on Oromia Broadcasting Network.

2.5. Animal Management

All households construct individual house for each animals from locally available animals. All animals were managed individually in semi intensive management system. Initially they were provided with concentrate feed from the center those feed not available in their area and supplement their animals with concentrate. All animals were hand milked twice a day with calf suckling. Few of them were also produced improved forages and used as a feed for their animals.

2.6. Capacity Building

Training was given to all participating farmers, DA, expertise of the respective districts and concerned bodies on improved dairy cattle management, feeding, housing, breeding, health and basic concept cooperatives both before and after heifer distribution. Experience sharing was arranged and they share experience from successful dairy groups previously organized at Kofale.

2.7. Data Collected

Baseline data before and after intervention was collected by using Semi structured questionnaires. Milk production, consumption and marketing, breeding, sex of claves born, milk price, conventional management system, monthly income generated, amount and purpose for which income generated expend records were collected. Data record book was provided to each farmers on which they record daily milk production, consumption, marketing, monthly income and expense.

2.8. Data Analysis

Collected data through semi structured questionnaires, milk production, consumption, marketing, income and expenditures were entered into Ms-Excel. Processed data were imported and analyzed by using descriptive statistics of SPSS ver. 20.

3. Results and Discussions

3.1. Sex, Marital Status, Education Level and Religion of Respondents

The result indicates that 40 of respondents were female

whereas the remaining 60 were male and majority of respondents (80%) were married. Regarding their educational level 20 % of them where Illiterate and the remaining respondents were Read and write, primary, secondary and Diploma with equal 20 percentage share. All of the respondents were Muslims in their Religion. On average they have an experience of 11.6±6.38 years of experience in livestock production.

Table 2. Family members with age category of respondents.

Age category	Sex		Total
	Male	Female	
Overall total family members	3±0.9	3.2±1.9	6.2±1.93
Less than 15 year	1.8±1.13	1.3±1.3	3.1±1.19
15 to 45 year	1.1±0.56	1.4±1.07	2.5±1.35
Greater than 45 year	0.2±0.42	0.4±0.51	0.60±0.84

As indicated in table 1 above the overall family member in current study is 6.2±1.93. Regarding the age category of family members majority of them were children's less than 15 year followed by 15 to 45 year age category. This implies

that the demand for milk and milk products were high for home consumption. so, increasing milk production per animals and per household is important and essential not only for meeting family home consumption and improving nutritional composition of family food but also it increase family income through reducing costs incurred for milk and milk products purchase whereby getting additional income from sale of milk and milk products.

3.2. Dairy Cattle Herd Structure

As indicated on figure 1 below the major benefit after intervention was improvement in dairy herd structure of the household intervened. All of the respondents (100%) indicated that their dairy cattle herd structure has changed after intervention. The number of crossbred animals were significantly increased after intervention on average one household own minimum one (1) Crossbred Cows with the maximum of three (3) crossbred animals. On average the current monetary value of calves born form distributed crossbred cows were estimated to be 7571.4± 2636.7ETB.
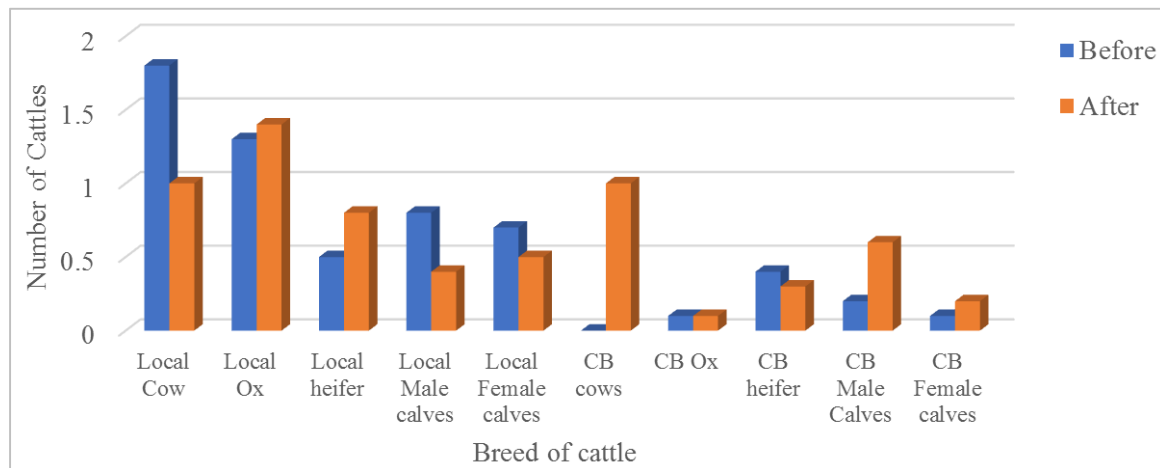

Figure 2. Dairy cattle herd structure before and after intervention.

3.3. Milk Production, Consumption and Marketing

Table 3. Average Milk production, consumption and marketing before and after intervention.

Parameter	N	Before intervention	After intervention
		Mean ± SD	Mean ± SD
Production lit /cow/day	10	1.75±1.21	6.8±1.47
Total Milk produced lit /day/hh	10	2.96±1.81	6.9±1.19
Consumption lit /day	10	1.62±1.31	3.1±0.99
Processed lit /wk	10	6.73±2.49	9.2±2.65
Sold lit /day	10	0.72±1.27	3.4±0.96

N= number of respondents.

The result indicates that milk production, consumption and marketing was improved after intervention. Milk production increased from 1.75±1.21 liter/Cow/day to 6.8±1.47 liter/Cow/day. The current average milk yield result was almost comparable with the findings of [7] average milk yield of 6.59±0.065 L around Meki area. But it was higher than the result from Kersa Malima area which was 4.73±3.2L

[10]. They indicated that only 20% of respondents sale milk before intervention since their production not sufficient to meet family consumption but all of the respondents start sale of milk after intervention beyond meeting their family milk and milk products consumption. Milk market was located at Heraro town which was around 4-5Km far from them and they transport on foot milk daily to the town and they sale to

retail traders at the town. Average price was 23.1±1.4 ETB per liter of milk and they indicated that milk price was lower during rainy season and there was no sufficient demand. Milk price were higher than the report by [7] which reports 15ETB/liter around Meki area and the difference might be due to location and year difference in the study areas.

All of the respondents (100%) indicated that their household generated income was improved after intervention. On average one household generated additional 1640 ± 469.51 ETB per month from sale of milk after intervention. The purpose for which they expend the generated income from sale of milk indicated in table 3 below.

Table 4. Ranking purposes for which generated income expend.

Purpose of expenditure	1st	2nd	3rd	4th	5th	Index	Rank
Agricultural input purchase	6	2	2	0	0	0.3	1
Household expenditure	1	5	4	0	0	0.26	2
Purchasing of Animal feed and health service	0	0	1	9	0	0.14	3
Purchasing livestock	2	1	1	0	0	0.12	4
House construction	2	1	0	0	0	0.09	5
Student school expense	0	0	1	1	0	0.03	6
Starting small scale business	0	0	1	0	0	0.02	7

Purchasing of agricultural inputs like fertilizer, seed, pesticides and herbicides were the major purpose for which generated income expend followed by drugs and household miscellaneous expense and purchase of concentrate feed and veterinary service and drugs. The average amount of expense they expend for different purpose was indicated in the following table 4.

Table 5. Average amount of expenditures they expend from generated income.

Amount expend for type of expenditure	N	Average amount of expense Mean ± SD
Agricultural input	10	3193 ±1632
Miscellaneous household expenditure	10	2250 ±1002
Livestock Purchase	4	4550 ±3724
House construction	3	4333 ±1154

N= number of respondents.

3.4. Family Milk Consumption Improvement

All of the respondents (100%) indicated that their family doesn't get sufficient milk and milk products for consumption before intervention and vice versa after intervention. The milk consumption has increased on average from 1.62 ±1.31 to 3.1±0.99 liter/day/household. As indicated on table 1 the average number of family number was 6.2 ± 1.93 and majority of the age group were children's less than 15 years old which means the demand for milk and milk products for balanced family nutrition was high and meeting this demand was the great success for the house hold after intervention not only meeting family nutrition but also minimizing the cost incurred for purchasing of milk and milk products.

3.5. Organizing Self Help Group

Only 20% of respondents participate in any credit and saving groups before intervention but 70% of them has interest to participate in any credit and saving groups. Social institution (Muslim religion prohibit interest) vs support institution (OCSO to provide credit and saving) The major reason limiting them to participate in credit and saving groups are religious reason since all of respondents are Muslims in their religion. So, as a solution we organize one self-help group which was arranged in the manner that address their problem to provide credit and saving service free of interest and currently all of them including all husband and wives were members of the group. Organized self-help group has 18 (10 Female and 8 male) members. The group name was "Garee Horsisa Horii Aannanii Doyoree" each member will contribute 60 ETB birr per month and they contribute 100 ETB per person as initial. In addition to saving to the group in side they have Equb in which every member contribute 100 birr per month and one member get 1000birr month. All members get 1000 ETB form Equb and them purchase Sheep, start small scale business and expends for miscellaneous household expenditures.

3.6. Capacity Building

3.6.1. Training and Promotional Events
Majority of respondents (80%) indicated that they didn't get any training on dairy cattle management and even participated ones reported that they didn't get enough awareness and knowledge. Meanwhile after intervention all of them both husband and wives has got training on improved dairy cattle management and indicated that they got enough awareness and knowledge. A total of 41 participants has got training on imp improved dairy cattle management, feeding, housing, breeding, health and basic concept cooperatives b interdisciplinary team from ATARC and Dodola District Cooperative promotion Agency.

Table 6. Training participants.

Name of district	Name of kebele	Participants								Total
		Farmer		DAs		Experts		Others		
		M	F	M	F	M	F	M	F	
Dodola	Ketaberenda	12	11	3	0	3	1	10	1	41

3.6.2. Promotional Events

A total of 74 participants attend on field experience sharing arranged with previous organized successful Dairy groups at Kofale district of West Arsi zone and both family members, DA's, and experts had participated.

Table 7. Experience sharing Participants.

Name of district	Name of kebele	Participants								Total
		Farmer		DAs		Experts		Others		
		M	F	M	F	M	F	M	F	
Dodola	Ketaberenda	30	28	1	0	1	0	10	4	74

3.7. Challenges

Animals management were not uniform across the farmers.
Few farmers doesn't record data continuously.
Lack of Artificial insemination service in the area.

3.8. Solution Given

Monitoring and providing additional training.
Distributing improved F1 bulls.

4. Conclusions and Recommendations

The result of current study indicated that distributed pregnant crossbred F1 heifers to women through AGP II research wing project had brought significant increment in household milk production and production whereby improve family members access to source of animal protein which improve family nutrition through providing balanced nutrition. Not only milk yield household income was significantly improved after intervention through sale of milk. On the other hand they also cover their expense for purchasing agricultural inputs, miscellaneous household expenditures and student's school expense from the income generated. So, the current findings indicates that how one F1 crossbred heifer contributes to the improvement of family nutrition and livelihood of small holder farmers and further efforts has to be done to gap the demand for improved breed with reliable price for smallholder farmers and appropriate market should be linked for input supply and milk sale in in addition animal health and Artificial insemination service has to be available in the area.

Acknowledgements

References

[1] Adami Tulu Agricultural Research Center. 2015. Information bulletin on major achievements. Compiled by Tesfaye Gemechu.

[2] Agricultural Transformation Agency (ATA). 2012. Agricultural Cooperatives Sector Development Strategy 2012 – 2016, June 2012. Addis Ababa, Ethiopia.

[3] Amare Biftu. 2014. Determinants of Women Farmers' Participation in Seed System: The Case of Local Seed Business in Sinana, Agarfa and Dodola Districts of Southeastern Oromia, Ethiopia M. Sc. Thesis, October 2014. Haramaya University, Ethiopia.

[4] Dawit Alemu, Shahidur, S. and Tripp, R. 2010. Seed System Potential in Ethiopia: Constraints and Opportunities for Enhancing the Seed Sector. Sustainable Solutions for ending Hunger and Poverty. IFPRI Working Paper, International Food Policy Research Institute.

[5] Digital soil and terrain data base of east Africa (1997). Notes on the ARCINFO files. Food and Agricultural Organiztion of the United Nation, version 1.0.

[6] ELDMPS (Ethiopia Livestock Development Master Plan Study) (2007). Livestock Development Master Plan Study, Volume 1-Dairy. Phase 1 Report- Data collection and Analysis. Government of Ethiopia Ministry of Agriculture and Rural Development. (www.igaddata.org/index.php).

[7] Estefanos Tadesse and Girma Chalchisa, 2018. Demonstration of improved management of F1 cow for farmers around Meki area for livelihood improvement. Workshop proceeding for Completed Research activities of Pre- extension Demonstration of Agricultural Technologies supported by AGP II, 25-27 June 2018. Adama, Ethiopia Pp 86-91.

[8] FAOSTAT (Food and Agriculture Organization Statistics) (2012). FAOSTAT Livestock primary, cow whole milk production.

[9] Kaba Merga. 2009. Analysis of the Gender Disparity in Agricultural Extension Service Delivery: The Case of Gedeb Woreda, West Arsi Zone, Oromia Regional State. M. Sc. Thesis. Haramaya University, Ethiopia.

[10] Ketema Worku, 2013. Assessment of dairy cattle feed resource and milk yield under small holder farmers in Kersa malima Woreda. Thesis submitted to the college of veterinary Medicine and Agricultural of Addis Ababa university in Partial fulfillment of the requirement for degree of Masters of Science in Tropical Animal production and Health Pp 21 45.

[11] Mukasa-Mugerwa, E., 1989. A review of reproductive performance of female Bos indicus (Zebu) cattle. ILCA Monograph No. 6. International Livestock Center for Africa, Addis Ababa, Ethiopia, pp: 2.

[12] Tadesse B (2002). Reproductive performances of zebu (fogera) breed in the central highlands of Ethiopia. DVM thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debre Zeit, Ethiopia.