

Assessment on Farmers Training and Adoption of Dairy Technologies in Smallholder Dairy Farming in Eastern zone of Tigray, Northern, Ethiopia

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Abstract- Farmers' training equips farmers with improved practices, which help them to adopt and practice effectively the taught improved practices. The skills acquired through training helps the recipient to carry out an improved practice effectively and efficiently for better profit. If farmers are well trained in new practices, they may need minimal technical advice and outside backup support. This study was carried out in eastern zone of Tigray region to assess on farmers training and adoption of dairy technologies in small and micro enterprise dairy farmers. From purposively selected three districts 114 small and micro enterprise dairy farmers were interviewed and focus group discussions were conducted to gather valuable information. Descriptive statistics using SAS, version 9.2 was employed to analyze data. Figure and tables were used to present results. Almost all the sampled small and micro enterprise dairy farmers of the study areas were trained and reported that they got enough knowledge and skills regarding the dairy husbandry. The survey also revealed that 100% of SME dairy farmers in both Agulae and Hawzen and 85.71% in Wukro were taken Center of Competence and being certified. It was reported that 100%, 95.83% and 96.1% of the SME dairy farmers in Hawzen, Agulae and Wukro work being organized in quality circle, respectively for better profit. Majority of SME dairy farmers from Agulae and considerable numbers from Wukro were used dairy technology whereas in Hawzen the majority of SME dairy farmers were not used dairy technology. Dairy technologies and inputs like churner, milk processing plant, urea molasses block, urea treatment, molasses, wheat bran & nuge cake were among the most needed to be adopted by the respondents. The current survey result showed that almost all the sampled small and micro enterprise dairy producers of the study areas were trained and reported that they got enough knowledge and skills regarding the dairy husbandry. However, it was observed that there was a miss-understanding in all SME dairy farmers about kaizen because all considers it as only made hygiene. Therefore there is a need for further strong extension service to create the right awareness regarding kaizen and Center of Competence.

Key words: quality circle, network, small and micro enterprise, training, center of competence

I. INTRODUCTION

Farmers' training refers to educational services for influencing farmers to adopt improved practices in crop and livestock production [4]. The concern is not only with the learning and securing adoption of a particular improved practice, but also it can successfully bring about certain changes in the outlook and attitude of dairy farmers and thereby making them capable of rendering farming tasks more effectively and efficiently; continually seek means of improving farming enterprise. A farmer being a rational decision maker normally strives for a better standard of living and seeks ways of adopting new technologies to accomplish the set goals [6].

As described by Umar and Kumar¹⁰, majority of rural dairy farmers in Africa have experience in rearing animals while relying on traditional husbandry practices which may be the cause of low production and productivity of the dairy animals, however, these coupled with inadequate knowledge and skills on improved dairy husbandry practices, constrains them from adopting improved practices.

Generally knowledge and practical skills provision through farmers' training is thought to create a favorable mental attitude for the acceptance of improved practices especially of information-intensive and management-intensive practices [2] on adoption. Additionally, education is considered to reduce the amount of complexity perceived in a technology thereby increasing its adoption.

Effective dissemination of improved dairy husbandry practices through training is an important strategy for increasing adoption; it creates awareness and competence in the target audience about innovations [9]. Additionally, training in agriculture related practice improves farmers' ability to acquire accurate information, evaluate new production processes, use improved husbandry practices and understand and these benefits translates into adoption if a set of enabling factors and conditions exists to trained farmer [1]. When practice is improved and widely profitable, farmers' training may increase the probability of adoption as it enhances their ability to acquire, interpret and use information about such improved husbandry practice.

Farmers with no skills and know-how about certain improved husbandry practices have less probability of adopting new technologies that are introduced [5]. Farmers' training equips farmers with improved practices, which help them to adopt and practice effectively the taught improved practices. The skills acquired through training helps the recipient to carry out an

improved practice effectively and efficiently. If farmers are well trained in new practices, they may need minimal technical advice and outside backup support.

The ability of a dairy farmer to practice and generate more income from dairying largely depend on the effective adoption of improved dairy husbandry practices that leads to increase productivity. Hence, called upon the development of the dairy industry which comes from various forms include farmers' training and extension services that are effective forms in which farmers can have the knowledge and skills to manage the sector so that it can effectively contribute to their livelihoods and the national economy [7].

In an effort to address farmer's issues on improved dairy husbandry practices to dairy farmers in Ethiopia, the government established agricultural colleges who provided farmers training with short training programs in the form of formal and informal. The farmers training program in the country is being supported by various NGOs such as World Vision Ethiopia (WVE) and other charity organizations and local institutions such as office of agriculture and rural development, research intuitions and universities that worked towards alleviating poverty among smallholder dairy farmers in Ethiopia. Additionally, the various organizations provided support on promoting sustainable Agriculture by facilitating pass on schemes on livestock especially dairy animals and covering training costs of farmers in integrated dairy husbandry courses to small-scale dairy farmers.

Dairy farmers were trained in improved dairy husbandry practices mainly on proper feed and feeding, establishing of improved pastures and fodder trees, dairy farm record keeping, proper hand milking, construction and use of improved dairy house/structure, disease control, Selection and breeding of dairy animals. Despite these trainings, the extent to which the trained dairy farmers have adopted and are applying the practices they learned is not well established.

In addition farmers training programs may operate with an assumption that farmers will put into practice the improved practices they were taught while in reality there might be other factors limiting them. It is important to follow the degree by which the ultimate beneficiaries are actually changing and depicting any problems that have occurred so that measures and or modifications could be advanced to ensure increased use of improved practices [8]. This study therefore, focused to assess on farmers training and adoption of dairy technologies in small and micro enterprise dairy farmers in Eastern zone of Tigray region.

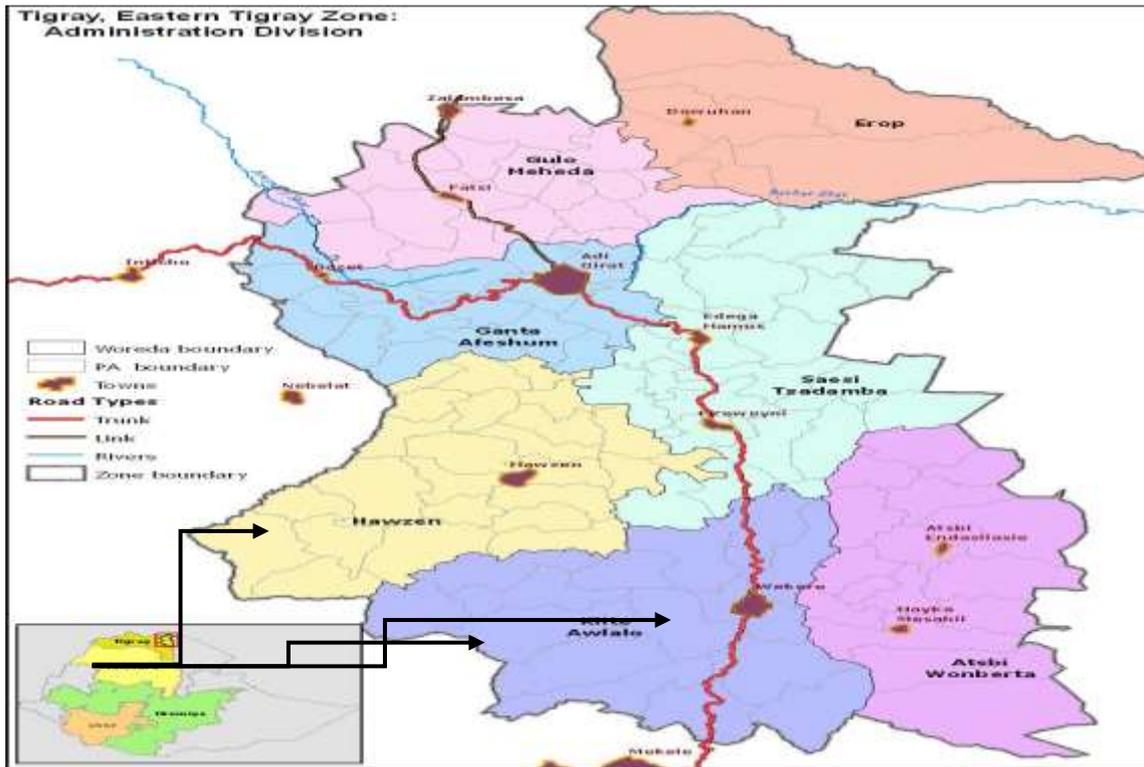
II. MATERIALS AND METHODS

Study Area: the study was conducted in 2014 in Eastern zone of Tigray, Northern Ethiopia. Purposively selected districts namely; Wukro, Agulae and Hawzien were considered (Fig. 1). These areas are situated at 140° 20' N and 39° 29' E. They have altitude ranges from 900-3200 m.a.s.l. The mean annual temperature varies from 15-19°C and mean annual rainfall ranges from 400-800 mm.

Study Design: Questionnaire survey and focus group discussion on training experiences, adoption of dairy farming technologies and the inputs needed by small and micro enterprise dairy farmers were conducted in three selected districts. A total of 114 small and micro enterprise dairy farmers were randomly selected and interviewed using semi-structured questionnaire. Large distribution of dairy cows, potential of milk production and no previous study conducted in the areas were bases for selecting the research sites. Group discussions were made with focus group established at each district with group comprising 5-7 members.

Statistical analysis: Descriptive statistics such as mean, frequency and percentage were used to analyze the data using SAS version 9.2 (SAS, 2008).

Figure 1. Map of the study area in Eastern zone of Tigray



III. RESULTS AND DISCUSSIONS

Small and Micro Enterprise Dairy farmers Training Experience and Center of Competence (COC) on Dairy Cattle production: In eastern zone of Tigray there are a number of small and micro enterprise dairy farmers however, most of them lack the required husbandry skills, training and opportunity to effectively improve their dairy production. Accordingly Agricultural TVET colleges are working taking a mission to provide training for both small and micro enterprise dairy farmers and small holder farmers in the form of informal training on the husbandry systems of dairy cattle production and others. Hence the current survey result showed that almost all the sampled small and micro enterprise dairy producers of the study areas were trained and reported that they got enough knowledge and skills regarding the dairy husbandry (Table 1). In the survey it was also indicated that the small holder dairy farmers got support from a number of institutes namely, Wukro Agricultural polytechnic college, NGOs, Mekelle University and OoARD. However, most of the dairy producers from Wukro and Agulae were supported only by Wukro Agricultural polytechnic college whereas all the milk producers of Hawzen got support by agricultural extension agents (Table 1).

Now a day’s the government has already set agricultural extension agents who support small and micro enterprises (SME) working in different sectors in each and every kebele’s of the country so as to improve their production and productivity. The present survey result showed that there was a good extension service in all the study areas by the agricultural extension agents (Table 1). In addition the survey also revealed that 100% of SME dairy farmers in both Agulae and Hawzen and 85.71% in Wukro did not take COC and their reason was lack of time and awareness. Regarding the kaizen it was reported that majority of the SME dairy farmers in all the study area had awareness but they did not implemented it properly (Table 1). It is found that there was a miss-understanding in kaizen because all considered it as only made hygiene. Therefore there is a need for strong extension service to create the right awareness regarding kaizen and COC.

Table 1. Training access and Center of Competence (COC) on dairy activities of the respondents in the study area

Variables (F, %)	Town			Overall
	Hawzen	Agulae	Wukro	
Took training on dairy activities (F, %)				
Yes	13(100)	24(100)	70(90.91)	107 (93.86)
No	0	0	7(9.09)	7 (6.14)
By whom got support^a (F, %)				
Extension Agents	13(100)	5(20.83)	40(51.95)	58 (51.04)
Wukro Polytechnic College	8(61.54)	24(100)	55 (71.43)	87 (76.56)
NGO	3(23.08)	22(91.67)	17(22.08)	42 (36.96)
Mekelle University	0	3(1.25)	7(9.09)	10 (8.8)
BoARD	0	12(5.00)	20(25.97)	32 (28.16)
Service of Extension Agents (F, %)				
Very Good	6(46.15)	9(37.5)	19(24.68)	34 (29.92)
Good	7(53.85)	14(58.33)	45(58.44)	66 (58.08)

Low	0	1(4.17)	6(7.79)	7 (6.16)
Not supported	0		7(9.08)	7 (6.16)
COC Assessed (F, %)				
Yes	13(100)	24(100)	66(85.71)	103 (90.35)
No	0	0	11(14.29)	11 (9.65)
If Yes (F, %)				
Competent	13(100)	24(100)	66(85.71)	103 (90.35)
Not yet Competent	0	0	0	0
If No COC Assessed why (F, %)				
Time shortage problem	0	0	5(6.58)	5 (4.4)
Not aware about it	0	0	6(7.90)	6 (5.28)
Kaizen awareness (F, %)				
Yes	12(92.31)	20(83.33)	64(83.120)	96 (84.21)
No	1(7.69)	4(16.67)	13(16.88)	18 (15.79)
If yes, do implementing (F, %)				
Yes	11(84.62)	20(83.33)	62(83.78)	93 (83.79)
No	2(15.38)	4(16.67)	7(9.46)	13 (11.7)
On going	0	0	1(1.35)	1 (0.90)
No response	0	0	5(6.76)	5 (4.5)

^aPercentages do not add up to 100% since respondent's selected more than one answer; COC= Center of Competence

Role of Quality Circle and Networks in Small and Micro Enterprise Dairy Producers: The experience in working together for a common goal earns best results rather than working alone because there is a complementarity to each other. Accordingly our government gave more emphasis for working in cooperatives such as organizing in quality circle and networking of farmers within quality circles who are working in different sectors. As per the current survey result it was reported that 100%, 95.83% and 96.1% of the SME dairy producers in Hawzen, Agulae and Wukro work being organized in quality circle, respectively for better profit (Table 2). The informants also reported that working in network under the quality circle (development group) have a number of advantages because it enables and facilitates sharing experience among the members, to create market linkage for milk selling, feed purchase and others (Table 2). However it was observed that the network is very strong only in Agulae whereas in Hawzen and especially in Wukro it is very weak therefore this requires strong effort in awareness creation regarding advantage of working in network within quality circle.

Table 2. Network of small and micro enterprise dairy farmers within quality circle in the study area

Variables (F, %)	Town			Overall
	Hawzen	Agulae	Wukro	
Network on dairy activities (F, %)				
Yes	13(100)	23(95.83)	74(96.10)	110 (96.49)
No	0	1(4.17)	3(3.90)	4 (3.51)
If Yes what terms gain^a (F, %)				
Experience sharing	13(100)	24(100)	8(89.61)	45 (39.6)
Market linkage	13(100)	23(95.83)	28(36.36)	64 (56.32)
Feed purchase	13(100)	22(91.67)	37(48.52)	72 (63.36)
Others	4(7.69)	0	14(18.18)	18 (15.84)

^aPercentages do not add up to 100% since respondent's selected more than one answer

Dairy Technology Beneficiaries and Its Value: The results on the number of SME dairy producers who used dairy technology or not, the technologies which are already in use and their importance are presented in Table 3. The survey result revealed that the majority of SME dairy producers from Agulae were used dairy technology whereas in Wukro even if it was not same as Agulae a considerable numbers of SME dairy producers were used dairy technology. However, majority of the SME dairy producers in Hawzen were not used dairy technology. This variation might be due to the presence of good extension service and better awareness on dairy technology in Agulae SME dairy producers. Whereas in Hawzen it was observed that there was lack of supply (87.5%) and awareness (12.5%) for dairy technology. Similarly, in Wukro 29.87% of the SME dairy producers were not used dairy technology; their major reason was capital, resistance to new technology and lack of awareness. Regarding the technologies which are used by the most of SME dairy producers in all the study towns were churner, urea molasses block (UMB) and urea treatment (Table 3).

Table 3. Dairy technology beneficiaries and its value

Variable (F %)	Town			Over all
	Hawzen	Agulae	Wukro	
Do you use technology				
Yes	5 (38.46)	20 (83.33)	51 (66.23)	76 (66.67)
No	8 (61.54)	4 (16.67)	23 (29.87)	35 (30.70)

On the way to use	0 (0)	0 (0)	3 (3.9)	3 (2.63)
If yes which technologies^a				
Churner	3 (23.07)	13 (54.21)	22 (28.6)	38 (33.44)
Urea molasses block (UMB)	3 (23.07)	11 (45.87)	43 (55.9)	57 (50.16)
Urea treatment	3 (23.07)	9 (37.53)	11 (14.3)	23 (20.24)
Others	1 (7.69)	8 (33.36)	4 (5.2)	13 (11.44)
No response	8 (61.54)	4 (16.68)	23 (29.9)	35 (30.8)
Is the technology important				
Yes	4 (80.00)	17 (85.00)	48 (94.11)	69 (90.79)
No	0 (0.00)	2 (10.00)	2 (3.92)	4 (5.26)
No awareness about them	1 (20.00)	1 (5.00)	1 (1.96)	3 (3.95)
If not why				
Capital	0 (0)	0 (0)	10 (43.48)	10 (28.57)
Resistance to new technologies	0 (0)	3 (75.00)	6 (26.09)	9 (25.71)
Carelessness	0 (0)	0 (0)	2 (8.7)	2 (5.71)
No awareness	1 (12.5)	1 (25.00)	4 (17.39)	6 (17.14)
Lack of supply	7 (87.5)	0 (0)	1 (4.35)	8 (22.86)

^aPercentages do not add up to 100% since respondent's selected more than one answer

Dairy Technologies Adopted by Small and Micro Enterprise Dairy farmers: In the present survey the dairy technologies which are required for the dairy production sector was assessed. As indicated in Table 4 the dairy technologies and inputs like churner, milk processing plant, UMB, urea treatment, molasses, wheat bran & nuge cake were among the most needed to be adopted by the respondent's. Therefore, cooperatives, privet enterprises, NGO's and other stalk-holders should participate in supplying the above mentioned inputs and technologies to both the small and micro enterprise dairy producers and other smallholder dairy farmers.

Table 4. Inputs and/or technologies needed by small and micro enterprise dairy producers in the study area

Variables (f, %)	Towns			overall
	Hawzen	Agulae	Wukro	
Inputs and/or technologies needed^a				
Churner	8 (61.52)	7 (29.19)	33 (42.9)	48 (42.24)
Urea molasses block (UMB)	9 (69.21)	3 (12.51)	8 (10.4)	20 (17.6)
Lactometer	7 (53.83)	0 (0)	3 (3.9)	10 (8.8)
Urea treatment	3 (23.07)	5 (20.85)	9 (11.7)	17 (14.96)
Molasses	9 (69.21)	3 (12.51)	5 (6.5)	17 (14.96)
Milk processing plant	3 (23.07)	15 (62.55)	18 (23.4)	36 (31.68)
Credit facilities	0 (0)	0 (0)	1 (1.3)	1 (0.88)
Wheat bran & Nuge cake	7 (53.83)	4 (16.68)	5 (6.5)	16 (14.08)
Aluminum coated or galvanized nickel	1 (7.69)	6 (25.02)	3 (3.9)	10 (8.8)
PPE & vehicle	0 (0)	1 (4.17)	0 (0)	1 (0.88)
Improved dairy cow	0 (0)	2 (8.34)	0 (0)	2 (1.76)
Nothing	0 (0)	1 (4.17)	28 (36.4)	29 (25.52)

^aPercentages do not add up to 100% since respondent's selected more than one answer

IV. CONCLUSION

The current survey result showed that almost all the sampled small and micro enterprise dairy producers of the study areas were trained and reported that they got enough knowledge and skills regarding the dairy husbandry. However, it was observed that there was a miss-understanding in all SME dairy producers about kaizen because all considers it as only made hygiene. Therefore there is a need for further strong extension service to create the right awareness regarding kaizen and COC. Informants reported a number of advantages of working in network under the quality circle. However, it was observed that the network is very strong only in Agulae whereas in Hawzen and especially in Wukro it is very weak therefore this requires a strong effort in awareness creation regarding advantage of working in network within quality circle. The technologies which are used by the most of SME dairy producers in all the study towns were churner, urea molasses block (UMB) and urea treatment.

V. ACKNOWLEDGMENT

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