Agricultural knowledge management in dairy production improvement: the case of Bure Woreda, West Gojjam zone, Amhara Region

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Abstract

The government of Ethiopia gives great attention to agriculture and rural development for the country's economy development. Dairy development is one of the components of agricultural development. To improve dairy production in certain locality, dairy producers should be able to access and use appropriate knowledge for the particular problem at the right time. This research was conducted to assess agricultural knowledge management system and its challenges and opportunities in Bure district. To address these objectives, both primary and secondary data were used. These were collected from primary (i.e. dairy producers and experts of different GOs and NGOs using semi-structured questionnaire and checklist) and secondary sources (i.e. literature reviews). To select representative respondents, multi stage sampling techniques were used. SPSS software (version 15) was used to analyze the data which is collected by questionnaire. As survey result, keeping the health condition of animals, feed green pasture to their milking cows, animal selection and using crossbreed cow are the major mechanisms, which are used by dairy producers, to improve the milk production in the district. They obtain these knowledge/mechanisms from WARDO, their own experience, neighbors and family through different means. These are observing the farmer's farm, listening to radio, experience sharing sessions and on-farm demonstrations. Majority of the dairy producers use the new knowledge by doing partial modification. They also transferred their knowledge to their neighbors, friends, relative and children. Therefore, concerned bodies should promote and strengthen the existing good practices in knowledge managements processes.

Key Words: Agriculture, dairy, knowledge.

Introduction

The Government of Ethiopia gives high priority to agriculture and rural development as an engine of pro-poor growth and efforts to enhance agricultural productivity, increase the commercialization of smallholder surpluses and reduce rural poverty are cornerstones of the government's economic growth strategy, i.e. Agriculture Development-Led Industrialization (Spielman *et al*, 2008). Agriculture is pivotal to Ethiopian economy development.

According to Teklu (2008), it contributes on average 46 percent of the real GDP and 85 percent of export earnings, and the sector employs about 85% of the population and about this 85% of the population lives in rural areas and practices subsistence agriculture and livestock production. Therefore, the development of Ethiopian agriculture will have direct impact on the overall development of the country.

Increasing milk production from cattle and buffaloes is a national priority in most developing countries, because milk is one of the most important foods in human nutrition (Devendra, 2007). To do so, the government of developing countries introduced improved exotic breeds into their country. Besides, for a long period, various research activities have been carried out on livestock sectors, particularly in dairy production development, in regional, national and international research institutions to generate knowledge/improved technologies. These generated knowledge/technologies mostly remained in the research centers rather than reaching into the end users.

Among other developmental resources, appropriate knowledge is an important resource. To bring development in dairy production, we need to have the right knowledge and able to utilizing this knowledge at the right time and place. So, developing knowledge management (identification, development, use and sharing of vital knowledge) system is very important in order to accelerate adoption of improved dairy technologies and enhance dairy production and productivity. Therefore, understanding knowledge management of a certain locality will help to develop appropriate researchable and development agendas. Thus this study was conducted to assess agricultural knowledge management system in dairy production and dairy improvement around Bure districts of Amhara Region.

Materials and methods

Description of the study area

Bure is one of the 15th woredas of West Gojjam Administrative Zone of Amhara National Regional State. It is one of the consistently surplus producer woredas of the Region. It is found 400 km northwest of Addis Ababa and 148 km southwest of the Regional State capital, Bahir Dar. It is nearby and connected by all-weather road to East

Wollega Zone of the Oromia Regional State and Metekel Zone of the Benishangul Gumez Regional State (Yigzaw and Kahsay, 2007). Population of the woreda is 169,609 of which 143,854 (85%) live in rural area. The number of agricultural households, 21,793, is about eight times higher than the households in the urban areas (Yigzaw and Kahsay, 2007). The total area of the woreda is 72,739 ha of which 46.6% is cultivated and average household cultivated land holding is about 1.6 ha. At present, the woreda is divided into 22 rural peasant associations (PAs) and two town associations. The annual rainfall ranges between 1386 and 1757 mm. Agro-ecologically, it is classified into moist and wet lowland (10%), wet Woina-Dega (82%) and wet Dega (8%). The altitude of the woreda ranges from 713 to 2604 meters above sea level. Long-term annual mean temperature of Bure ranges from 14 ^{o}C to 24 ^{O}C. The Woreda has three soil types namely Humic Nitosols (63%), Eutric Cambisols (20%) and Eutric Vertisols (17%) (Yigzaw and Kahsay, 2007).

Sampling procedures and methods of data collection

Sampling technique

Multistage sampling technique was used to select representative respondents. According to Adebabay (2009), in Bure woreda there are three milk production systems. These include rural smallholder, peri-urban and urban milk production system. This study was conducted based on these three milk production systems. The list of milk producers of rural, peri-urban and urban milk production system were obtained from the district agricultural and rural development office.

Therefore, first the study area was classified into three dairy production systems based on Adebabay's finding i.e. urban (inside Bure town), peri-urban (around Bure town) and rural (the rural parts of the Bure woreda) dairy productions. Second, from each urban and per-urban milk production system 30 milk producers were selected purposively because of the accessibility and willingness of the respondents. Rural milk production system was further classified into three agro-climate zones. These are lowland, midland and highland. From each agro-climate zones, one kebele was selected purposively based on its dairy production potential and accessibility. Finally, because of the accessibility and willingness of the farmers, 10 farmers were selected purposively from each respective kebeles. Therefore, primary data were collected from 90 dairy producers who

are in urban, peri-urban and rural areas; and also from various service providers in the Bure woreda.

Data collection technique

The study was conducted using qualitative and quantitative research design. By doing so, both qualitative and quantitative data were collected. To collect both types of data both primary and secondary sources of data were used. Qualitative data sources were included participant observation (fieldwork), key informant discussion, focal group discussion, reviewing documents and texts. To gather information in the qualitative part, this research typically relied on the analysis of documents and materials. Therefore, extensive related research and literature reasoning were reviewed. In quantitative part of the study semi-structure questionnaire were implemented. To ensure the validity of the questionnaire pre-testing was conducted. Finally, well appropriate semi-structured questionnaire was developed and used for the fieldwork interview.

Data sources

In this study both primary and secondary data were used. Primary data was collected using a multitude of data collection techniques from the dairy producers, extension workers, researchers and others which are working on dairy production development in the woreda. Secondary data was collected from the woreda Agricultural and Rural Development office's annual and quarter reports, different research findings, MIPS's documents, documents of milk cooperative etc.

Data analysis

Once the raw data was collected, quantitative and qualitative methods of data analysis were employed. Descriptive statistical tools such as frequency tables, percentages, graph, mean and standard deviation were used to describe the data. To test the difference among the subsystems on a certain variable, both t-test and chi-square statistical tools were used. Then based on the information obtained from data analysis, generalizations about the population were made. For data analysis SPSS (version 15) software was used. For the data gained through key informant interview and unstructured interviews qualitative analysis was applied.

Result and discussion

Knowledge management on dairy production

In the study area, farmers who are engaged in dairy production try to find solution for their dairy production problems by themselves and were able to acquire adequate experience/knowledge on dairy production management. They acquired this experience/knowledge from different sources, through different means, utilize in different forms, shared to other dairy producers. The details of these KM process in the study area are illustrated in the following subchapters of this paper.

Farmers' mechanism to improve milk production

Majority of the respondents (89.9%) believe that keeping the health condition of their animal is the most important mechanism to improve milk production and 79.8% of the respondents feed green pasture to their milking cows, 66.3% of the respondents exercise animal selection, and 46.1% of the respondents use crossbred cow to improve milk production (Table 1) in their dairy farm.

In the study area, few respondents also used concentrate animal feed (43.8%), give special treatment to milking cow from its calving stage (21.3%) and increase number of milking cow (15.7%) as mechanisms to improve milk production in their dairy farm. In the contrary, only two respondents (one from peri-urban and rural subsystems) do not use any mechanisms to improve their milk production in their dairy farm.

As Table 1 shows, some of the mechanisms have statistically significant different across subsystems in improving milk production in the district. Some mechanisms such as using improved crossbred cow, feeding green pasture and keeping animal health mechanism show statistically significant difference ($p<0.01$) and feeding concentrate animal feeds to milking cow also showed statistically significant difference ($p<0.05$) across the sub systems. In the contrary, mechanisms of animal selection, increasing number of milking cows and giving special treatment to milking cow from its calf stage didn't show statistically significant difference across the subsystems.

Table 1**.** Frequency distribution of the respondents on mechanisms of milk production improvement.

Mechanisms to improved milk production		Sub system			Total	Test value ($x^{2)}$	Sig.
		Urban	Peri-urban	Rural			
Improved crossbred cow	N	23	9	9	41	17.56	***
	%	25.8%	10.1%	10.1%	46.1%		
Concentrate animal feed	N	18	8	13	39	6.79	**
	%	20.2%	9.0%	14.6%	43.8%		
Green pasture	N	29	27	15	71	22.95	***
	%	32.6%	30.3%	16.9%	79.8%		
Keep animal health	N	30	28	22	80	11.7	***
	%	33.7%	31.5%	24.7%	89.9%		
Animal selection	N	23	19	17	59	2.76	NS
	%	25.8%	21.3%	19.1%	66.3%		
Increase number of milking animal	N	6	4	4	14	0.68	NS
	%	6.7%	4.5%	4.5%	15.7%		
Give special treatment for cow from its calf stage	N	14	2	3	19	17.75	NS
	%	15.7%	2.2%	3.4%	21.3%		
Nothing to do	N	0	0	1	1	1.1	NS
	%	.0%	.0%	1.1%	1.1%		
Total	N	30	30	29	89		
	%	33.7%	33.7%	32.6%	100.0%		

***, **, and * statistically significant at 1%, 5%, and 10% probability level, respectively. NS = statistically not significance.

Farmers' sources of knowledge for dairy production improvement

The major sources of knowledge on dairy production in the study area are *Bure* woreda Agricultural and Rural Development office (BWARDO) (54.7%), their own experience (46.5%), neighbors (33.7%), family (32.6%), radio (27.9%) and friends (26.7%) (Table 2). Radio (20.9%), TV (18.6%), farmers' experience (17.4%) are the major sources of knowledge for dairy producers in urban subsystems, while BWARDO, farmers' experience and neighbors are the major sources of knowledge for both peri-urban and rural dairy producers. No respondents in the rural dairy production systems use research centers, TV, reading material and formal education as source of knowledge on dairy production improvement (table 2). Some of the sources of knowledge such as TV, radio,

and reading materials show statistical difference ($p<0.01$) across the subsystems and college of agriculture as source of knowledge was statistically different ($p<0.05$) across the subsystem. The other sources of knowledge were not statistically different across the subsystems.

Table 2. Source of knowledge on dairy production improvement.

Farmers' source of knowledge	Subsystems						Total		Test value (X^2)	Sig.
	Urban		Peri-urban		Rural					
	N	%	N	%	N	%	N	%		
Her/ his own experience	15	17.4	11	12.8	14	16.3	40	46.5	1.17	NS
Family	8	9.3	9	10.5	11	12.8	28	32.6	0.73	NS
Neighbor	10	11.6	10	11.6	9	10.5	29	33.7	0.10	NS
Friends	8	9.3	8	9.3	7	8.1	23	26.7	0.12	NS
Community Elders	2	2.3	0	0.0	4	4.7	6	7.0	4.29	NS
Research Centers	1	1.2	1	1.2	0	.0	2	2.3	1.02	NS
BWARDO	13	15.1	17	19.8	17	19.8	47	54.7	1.43	NS
TV	16	18.6	0	0.0	0	0.0	16	18.6	38.9	***
Radio	18	20.9	3	3.5	3	3.5	24	27.9	25.57	***
NGOs/IPMS	2	2.3	2	2.3	1	1.2	5	5.8	0.42	NS
Reading material	9	10.5	0	0.0	0	0.0	9	10.5	20	***
College of agriculture	3	3.5	0							

observing the farmers' dairy farm (18.5%), whereas majorities of dairy producers in peri-urban dairy subsystem access to knowledge through observing farmers' farm (24.7 %) and experience sharing sessions (7.4%). In rural subsystem, the majority dairy producers access to knowledge through observing the farmers' farm (18.1 %), listening to radio (7.2%) and experience sharing sessions (6.0%) (Table 3).

Table 3. Means through which dairy producers can access to knowledge on dairy production improvement.

Means of knowledge getting		Subsystems			
		Urban	Peri-urban	Rural	Total
Observing the farmer's farm	N	15	20	15	50
	%	18.5%	24.7%	18.5%	61.7%
On-farm demonstration	N	9	3	5	17
	%	11.1%	3.7%	6.2%	21.0%
Visiting research center	N	0	2	3	5
	%	.0%	2.5%	3.7%	6.2%
Technology exhibition	N	1	0	2	3
	%	1.2%	.0%	2.5%	3.7%
Experience sharing sessions	N	9	6	5	20
	%	11.1%	7.4%	6.2%	24.7%
Watching TV	N	16	0	0	16
	%	19.8%	.0%	.0%	19.8%
Listening to radio	N	18	3	3	24
	%	22.2%	3.7%	3.7%	29.6%
Training	N	5	4	3	12
	%	6.2%	4.9%	3.7%	14.8%
Formal agricultural education	N	2	0	0	2
	%	2.5%	.0%	.0%	2.5%
Reading	N	9	0	0	9
	%	11.1%	.0%	.0%	11.1%
Tota	N	29	29	28	86
	%	33.7%	33.7%	32.6%	100%

Knowledge utilization on dairy production improvement

Majorities of dairy producers in *Bure* district are modifying new knowledge on dairy production improvement when they use it. As Table 4 shows, majority dairy producers (50.6%) use the new knowledge by partially modifying, 40.2% of dairy producer use the new knowledge as it is and only 11.5% of the respondents use the new knowledge by totally modifying based on their own farming system. In the study area, the overall

nature of knowledge utilization in all dairy production systems is the same but its proportion is varying among dairy production subsystems.

Table 4. Frequency distribution of the respondents on knowledge utilization.

			Knowledge utilization			
			Knowledge utilization as it is	Partial modification	Totally modification	Total
Dairy production systems	Urban	N	10	16	4	29
		%	11.5%	18.4%	4.6%	33.3%
	Peri-urban	N	13	14	3	30
		%	14.9%	16.1%	3.4%	34.5%
	Rural	N	12	14	3	28
		%	13.8%	16.1%	3.4%	32.2%
Total		N	35	44	10	87
		%	40.2%	50.6%	11.5%	100.0%

Knowledge transfer

Majorities of dairy producers (88.9%) transfer their new dairy production improving knowledge to other dairy producers (Table 5). There is no statistically significant difference among the subsystems in knowledge transferring. 28.9%, 31.1% and 28.9% of the respondents of the urban, peri-urban and rural dairy producers, respectively, transfer their knowledge to other dairy producers.

Majorities of the respondents transfer their knowledge to their neighbors (94.9%) and followed by friends (74.7%), relative (69.6%) and children (40.5%). There is no statistically significant difference in the persons to whom knowledge is transferred among subsystems, except transferring to children (Table 5).

Table 5. Frequency of distribution of individuals to whom the respondents transfer their knowledge.

			Sub system				Test value ($X^{2)}$	Sig.
			Urban	Peri-urban	Rural	Total		
Knowledge transferring	Yes	N	26	28	26	80	0.9	NS
		%	28.9%	31.1%	28.9%	88.9%		
	No	N	4	2	4	10		
		%	4.4%	2.2%	4.4%	11.1%		
Dairy producers transfer knowledge to	Friends	N	18	21	20	59	0.69	NS
		%	22.8%	26.6%	25.3%	74.7%		
	Children	N	8	9	15	32	4.17	**
		%	10.1%	11.4%	19.0%	40.5%		
	Relative	N	14	20	21	55	4.02	NS
		%	17.7%	25.3%	26.6%	69.6%		
	Neighbor	N	24	27	24	75	1.44	NS
		%	30.4%	34.2%	30.4%	94.9%		
Total		N	25	28	26	79		
		%	31.6%	35.4%	32.9%	100.0%		

** = statistically significant at 5% probability level and. NS = statistically not significance

Farmers' means of knowledge transferring

Dairy producers can transfer their knowledge to other dairy producers through different means. There is no statistical significant difference in all farmers' means of knowledge transferring across the subsystems in the study area (Table, 6). Majorities of the respondents (80.2%) transfer their knowledge to other dairy producers through informal discussion and followed by experience sharing (29.6%) and allowing farmers to visit their own dairy farm (25.9%). Only few respondents (2.5%) transferred their knowledge through written materials, 100% of them were used in the urban subsystem.

Table 6. Farmers' means of knowledge transferring.

Respondents' means of knowledge transferring		Subsystems			Total	Test value (X^2)	Sig.
		Urban	Peri-urban	Rural			
Allow the farmers to visit my own dairy farm	N	6	8	7	21	0.37	NS
	%	7.4%	9.9%	8.6%	25.9%		
Informal discussion	N	22	23	20	65	0.78	NS
	%	27.2%	28.4%	24.7%	80.2%		
Experience sharing	N	9	7	8	24	0.34	NS
	%	11.1%	8.6%	9.9%	29.6%		
Through written material	N	2	0	0	2	4.09	NS
	%	2.5%	.0%	.0%	2.5%		
Total	N	26					

listening to radio and experience sharing are the major means of access to knowledge on dairy production improvement.

Dairy producer use the new knowledge by partially modifying in accordance with their farming system. Some of dairy producers use the new knowledge as it is which comes from other sources. Only very few respondents use the new knowledge by totally modifying which can fit to their farming systems. Either before or after utilizing the knowledge they can transfer their knowledge to other dairy producers. Majority of dairy producers transfer their knowledge to their neighbors, friends, relative and children via informal discussion, experience sharing and allowing farmers to visit their own dairy farm.

Dairy producers in the study area face different problems in accessing as well as transferring knowledge. Inadequate technology, poor delivery system, complex nature of the technology and long distance of knowledge source are the major problems of the farmers for accessing knowledge on dairy production improvement. Alike the hindering factors in accessing knowledge, the major problems in transferring new knowledge to other dairy producers are also lack of adequate knowledge/ improved dairy technology, lack of awareness and even the dairy producers themselves are not interested to transfer their knowledge.

Since in the study area has three dairy production systems, any planning on dairy production development should be carried out based on the nature and characteristics of the dairy subsystems in order to avoid blanket recommendation and able to transfer appropriate dairy technologies to the right farming system.

To avail important knowledge for dairy producers in the study area, government and non government body should approach the local community through the existing knowledge management system and then further efforts should be taken to transfer the existing knowledge management system into technology based knowledge management system. In the study area efforts should be made to improve the availability of health service in terms of quality and quantity in all dairy subsystem by encouraging private sectors to involve in the sector.

To alleviate concentrate feed shortage, government should design good strategy to encourage and support the available milk cooperatives to involve in input supplying system for dairy production. For this *Bure Damot* milk cooperative can take the leading role in solving the problems. Local government and planer should design the strategy in which College of Agriculture and Research Centre around in the study area to involve in dairy production development process.

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