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The Effect of Housing and Waste Management Practice for Milk Production in Arba Minch Town, Gamo Zone, Ethiopia

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Abstract

The objective of the study was to assess waste management practice of small holder dairy farms in Arba Minch town. The survey methodology was systematically purposive sampling using semi-structure questionnaires. Herd composition were observed lactating cows (15%), pregnant cow (10%), lactating and pregnant (20 %), heifer (10%) bull (10%) oxen (10%) male calf (10%) and female calf (15%). While in the sechaarea; lactating (20%), pregnant (10%), lactating and pregnant cow (25 %), heifer (10%) bull (5%) oxen (10%) male calf (10%) and female calf (10%). So in the study area most respondent holds lactating and pregnant cows. Respondent uses open barn, open camp and others. That not comfortable for animal. This covers (22%), (7.5%) and (2.5%) of respondent respectively. The major wastes are dung, urine (52.5%).Most respondent (95%) said that wastes affect animal, human, environment. It sometimes cause of complain with neighbors due to leaking of wastes and bad smell from the farm (82.5) and source some zoonotic disease, cough and etc.

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Keywords

Dairy farms, Waste management, Smallholder.

Introduction

Ethiopia is one of the major developing countries, where agricultural sector is a corner stone of the economic and social life of the society. This sector employs 80-85% of the population and contributes 40% GDP. The urban and pre-urban dairying constitutes important sub-sector of agricultural production system. The large and diverse livestock genetic resources, existence of diverse agro-ecological are suitable for dairy production (Azage *et al.*, 2003).

In Ethiopia, Dairy production is the major development activity in the livestock sector. The purpose of keeping dairy cows in Ethiopia is particularly to generate income, risk minimization and house hold nutrition (CSA, 2003). On the other hand, Ethiopia has a huge potential for dairy development in Africa. The large and diverse livestock genetic resources, existence of diverse agro-ecologies suitable for dairy production, increasing domestic demand for milk and milk products, better market opportunity, and proximity to international markets indicate the potential and opportunities for dairy development in the country.

However, dairy development has been hampered by multi-faceted, production system-specific constraints related to genotype, feed resources and feeding systems, access to services and inputs, low adoption of improved technologies, marketing and absence of clear policy support to the sector. Thus, in order to mitigate challenges that limit productivity and thereby exploit the

untapped potential, it is necessary to characterize and analyze dairy production and marketing systems, identify major constraints along the value chains and devise pertinent and practical strategies to alleviate the problem and improve dairy production and marketing systems in the country. The Improving Productivity and Market Success (IPMS) of Ethiopian farmers' project, implemented by the International Livestock Research Institute (ILRI) on behalf of the Ethiopian Ministry of Agriculture (MoA), has undertaken a series of studies, which characterized smallholder dairy production and marketing systems in its PLWs and other sites in Ethiopia. Housing system and waste management are the important issue that relates with dairying in order to increase animal productivity also improves the quality of milk and its products. If the waste material is not managed properly it affects environment, milk quality as well as people. Teats and udder of cows inevitable becomes soiled while they are laying that stalls or when they are allowed to stay in the muddy barn yard (Haile, 2011). This decrease average performance of cows those give as well as they no sense of comfort since high accumulation of manure and left of feeds and the yard (Sintayehu, 2007).

Also there is a problem of waste material and housing. This affect dairy farm in different ways and it pollute the environment and quality of milk. It also source of bade order and flies, source of conflicts with neighbors and source of zonotic diseases (Azage *et al*., 2001). How ever this kind of study has not been conducted, there for by this study the gaps will be fulfilled.

Statement of problem

Housing and waste management are the most important issues in the dairy farm. It is essential that housing, feeding and general care are important thing for increase the performance of animal. Besides this an efficient management of cattle is not be complete without improve well planned and adequate housing.

Improper planning in the arrangement of dairy housing results in additional lab or charges and reduces the profits of the owner. Some study relates this problem with the lack of knowledge about waste material and their effect and advantage. There is a problem with waste material that affect environment.

Simultaneously such like studies has and been conducted in Addis Ababa. Addis Ababa city started its solid waste management some three decades back. The service cannot meet changing demands. The social waste collection service is unsatisfactory; and scenes of scattered waste are common in most part of the city (UNDP, 2004). As a result, the population has the opinion that the municipal solid waste collection service is not functioning properly. As a result of this, the willingness of the population to cooperate with waste collection operation and to pay for the service is low.

With respect to the organization of operations and management structure, collection and disposal are parts that are poorly organized. A disposal site situated at one corner of the city is also the main determining factor for collection and disposal of wastes in the city. This means that it is only those people close to the dumpsites that benefit. Dump sites and trucks for solid waste disposal are insufficient.

In densely populated Kebeles, the majority of people live 0.5 –1.00 km from accessible roads where transfer containers are located, when the recommended distance is 150 m from the housing units (Zerayakob, 2002). Solid waste collected from hospitals, residential and business areas is dumped at the landfill sites on the outskirts of the city. It is common to find refuse pileup at road intersections or strewn in open spaces. With context to processing and recycling of social waste, little is done at all level of its management.

However, no or little study has been conducted so far in Arba Minch town regards to dairy farm waste management practice, so this study attempt to investigate waste management, effect of waste material from dairy farms in Arba Minch town.

Objective

General objective

To assess the effect of house and waste management practice of small holder dairy farms for milk production in Arba Minch town, Gamo zone Ethiopia.

Specific objectives

To assess the effect of dairy housing system for milk production in Arba Minch city, Gamo zone Ethiopia

To assess the effect of waste management for milk production in Arba Minch town, Gamo zone Ethiopia.

Materials and Methods

Descriptions of the study area

The study was conducted in Arba Minch city which is the capital city of Gamozone administration. Arba Minch city is found in southern nation nationalities and peoples regional state of Ethiopia at a distance of 504km south of capital city Addis Ababa and 275 km south west of the regional city of Hawasa.

Arba Minch is located at 6^0 02´ 22´´ N latitude and 37^0 34´ 35´´ E longitude. It has moderate climate with average annual rain fall 900mm with an altitude of 1250m up to 1500m above sea level. The common agricultural activities in the study area are crop cultivation and rearing animal.

Sampling procedure

The study was conducted at selected two kebeles i.e. 03 kebele from secha sub city and limatkebele from sikela sub city depending on participating in dairy farming, with high number of dairy cattle and accessibility to market, and veterinary service environment in dairy activity. Accordingly a total of 40 households 20 from each kebele were selected using purposive sampling techniques.

Data collection

The sources of data were both primary and secondary sources. Primary data was obtained through questionnaires and observations.

The secondary data also was obtained from office of agricultural and rural development about socioeconomic, management, housing, feeding practice, waste management, environmental condition, production, and observation, Productivity, major disease, market of milk and products. Constraint and production data was collected from respondents through questionnaires.

Data analysis

Data was organized, summarized and analyzed using Microsoft excel 2007.Simple descriptive statistics such as mean, percentage, charts, graphs and standard devotion was employed in data analysis.

Results and Discussions

Household characteristics and socio-economic profile of dairy keepers

From the study area most of respondent (70%) were male and the remaining (30%) were female. The age of respondent in the study area are various in both farms (sikela and secha). The age ranges that less than 15 years was (30%) from total age distribution. The age ranges 15-55 year the majority portion (55%) of the family size of respondent. This range of age was more productive. The remaining (15%) were those greater than 55 years. From this study majority of the working age are engaged in dairy farming activity, therefore working age has its advantage for milk production (Table 1).

With regarding to educational status of the respondent head in both farms (elementary school, greater than secondary school, read and write and illiterate) were covers (47.5%), (27.5%), (17.5%) and (7.5%) respectively. But in sikela farm size the number of respondent that attend elementary school was large (50%) compared with secha farm size. The occupation of the respondent was mainly on privately jobs such as(construction work, electronics work, fisher man and etc.) and it covers (35%). The second occupation that most respondent participate on is merchant (25%). Farmers and employers were (22.5%) and (17.5%) respectively.

Feed and watering practice

The major feed resources are natural pasture, hay, crop residue and left feed. As a result shows 50%, 30%, 20% of hay+grass, grass+others and grass only respectively. In the study area there is scarcity of grazing land because of this the farm owner additional feed. In secha farm size half of the respondent (50%) out of 20 respondent use grass and others. In dry season this scarcity problem is more observed. The producers were simply release their cattle in open market place and other part of the town in search of wasted food, left food s and etc. according to respondent (Table 2).

The major water sources of the study area are river, pond, ground, pipe line and others according to respondent. Most respondent in the study area use river water (45%) for animals, but this result is different from the finding of sintayehu (2007) that majority (72%) obtained water for animal pipe water at Hawasa city. This is especially during dry season. At time of rain season cattle drink rain water after they stored.

Most of the river water used to cattle, those grazed freely around water routs other water sources (27.5%), (12.5%), (10%) and (5%) were ground, pipe line, others and ponds respectively.

Dairy housing system and cleaning activity

In the study area most respondent construct loose house for their animals (67.5%).which was different from that result indicated by (Asrat, 2013) that house hold in the town areas used cooking place for their animal at hawasacity.

Producers in sikela farm size are more (75%) use loose house than the other secha farm size which is (60%) the reason is in the sikela farm the owner keeps their animal in good performance by making suitable loose house in order to get what they want. Other respondent uses open barn, open camp and others. That not comfortable for animal. This covers (22%), (7.5%) and (2.5%) of respondent respectively.

Table 3 shows respondents about (50%) clean their dairy house once per a day. This is seen on owner of both farms.

Other respondent clean the barns or house more than two per a day (27.5%) and some respondents clean their dairy house twice per day (22.5%). Most farms that we observed during survey were not use water for cleaning activities of their farm.

Dairy cattle herd size, types of breeds and milking practice

The reason that the people keeps the animal was to use their products (milk, milk products, meat and etc.). The overall interviewed households in secha area the following herd composition were observed lactating cows (15%), pregnant cow (10%), lactating and pregnant (20 %), heifer (10%) bull (10%) oxen (10%) male calf (10%) and female calf(15%). While in the sechaarea; lactating (20%), pregnant (10%), lactating and pregnant cow (25 %), heifer (10%) bull (5%) oxen (10%) male calf (10%) and female calf (10%). So in the study area most respondent holds lactating and pregnant cows. In the study area all farmer (farm owner) hold local breeds (100%) table (4). This because of different things for example local breeds are needs less feeds when compare with exotic and cross breed and also ability to resist harsh environments and diseases. Some interviewed person indicates their product more attractive than others. Even if their waste not much problem like others since they take less feed. With regard to the milking frequency all respondent said that they milked twice per a day (100%). Which lined with result of (Yigrem, 2008) at Hawasa city.

Responsibilities of family members

The family members have their own function with respect to dairying activity in sikela and secha farm size area. In sikela and secha herding activity is mainly done by men (40% and 45%) respectively. Milking is done mainly by women (60%) in sikela and (75%) in secha.

In both farm size (sikela and secha) area women and children (90% and 10%) respectively is mainly responsible for milk processing. While selling of animal is mainly done by men (100%) in both sikela and secha farm size. The stall feeding activity done by hired labor (90%) and children (10%) in both sikela and secha farm size.

In the current study, dairying gives more opportunities for females to be closely involved in the daily management than other family members. This is consistent with the finding of fayo (2006) who reported that women members of the family engaged in dairy farm activities in urban and peri-urban areas of dire dawa (Table 5).

Waste management

Major wastes and collection mechanism

The major waste from sikelafarm size are dung, urine, left feed and water flow from the surrounding to the dairy farm(60%) due to large number of their cattle. While in secha farm size their mainly waste is dung and urine (75%) rather than dung, urine and left of feed since they holds small cattle. The amount of waste depends on number of animals These wastes where collected privately or by themselves (100%) according to respondent. Most respondent in the study area use simple equipment and their hands to clean the waste. In the study area dairy waste storage pond is constructed to collect and store manure, flush water, and polluted runoff from a dairy facility.

Storage is a relatively short period of90 to 180 days. Waste storage pond contents must be removed at the end of this storage period with land application the most common end use.

The waste storage pond must be constructed with an impermeable liner to prevent waste leakage to ground water. Because waste storage ponds produce an odor, they should be located downwind of neighbors, highways, and any public use area. Storage pond waste retains most of its fertilizer nutrients (Table 6 and 7).

Table.1 Household characteristics of dairy producers in Arba Minch city

variable		Farm category				
		Sikela (n=20)	%	Secha (n=20)	%	Over all mean
Sex of respondent	M	15	75	13	65	70
	F	5	25	7	35	30
Age distribution	<15	7	35	5	25	30
	15-55	10	50	12	60	55
	>55	3	15	3	15	15
Major occupation	Merchant	5	25	5	25	25
	Employer	2	10	5	25	17.5
	Farmers	6	30	3	15	22.5
	Others	7	35	7	35	35
Educational status	Illiterate	2	10	1	5	7.5
	Read and write	3	15	4	20	17.5
	Elementary	10	50	9	45	47.5
	>Secondary school	5	25	6	30	27.5

Table.2 Feed and watering system of dairy cattle in Arba Minch City

Variable		Farm category Sikela (n=20)	%	Secha (n=20)	%	Over all mean
Feed resource	Hay+grass	7	35	6	30	42.5
	Grass only	5	25	4	20	22.5
	Grass+ others	8	40	10	50	35
Sources of water	River	10	50	8	40	45
	ground	5	25	6	30	27.5
	Pond	1	5	1	5	5
	Pipe line	2	10	3	15	12.5
	Others	2	10	2	10	10

Table.3 Dairy housing system and cleaning activity

Variable		Farm category				
		Sikela(n=20)	%	Secha(n=20)	%	Over all mean
Type of house	Loose house	15	75	12	60	67.5
	Open house	4	20	5	25	22.5
	Open camp	1	5	2	10	7.5
	House together human	0	0	0	0	0
	Others	0	0	1	5	2.5
Frequency cleaning house	once	10	50	10	50	50
	twice	4	20	5	25	22.5
	More than two	6	30	5	25	27.5

Table.4 Dairy cattle holding, types and milking practice

Variable	Farm category					
	Status of the cattle	Sikela(n=20	%	Secha(n=20)	%	Over all mean
Herd size	Lactating cows	3	15	4	20	17.5
	Pregnant cows	2	10	2	10	10
	Lactating and pregnant cows	4	20	5	25	22.5
	Heifers	2	10	2	10	10
	Bull	2	10	1	5	7.5
	Oxen	2	10	2	10	10
	Male calves	2	10	2	10	10
	Female calves	3	15	2	10	12.5
Types of breed	Exotic	0	0	0	0	0
	Cross	0	0	0	0	0
	Local	20	100	20	100	100
Milking frequency	Once	0	0	0	0	0
	Twice	20	100	20	100	100
	thrice	0	0	0	0	0

Table.5 Responsibility of family members in the study area

Location	Activity	Family members							
		No	Men %	**No**	Women %	**No**	Children %	**No**	Labour %
Sikela(n=20)	Herding	**8**	40	**2**	10	**7**	35	**3**	15
	Milking	**2**	10	**12**	60	**4**	20	**2**	10
	Processing	**0**	0	**18**	90	**2**	10	**0**	0
	Sale of animal	**20**	100	**0**	0	**0**	0	**0**	0
	Feeding of animal	**0**	0	0	0	**2**	10	**18**	90
Secha(n=20)	Herding	**9**	45	2	10	**6**	30	**3**	15
	Milking	**0**	0	15	75	**2**	10	**3**	15
	Processing	**0**	0	18	90	**2**	10	**0**	0
	Sale of animal	**20**	100	0	0	**0**	0	**0**	0
	Feeding of animal	**0**	0	0	0	**2**	10	**18**	90

Table.6 Waste material and cleaning waste activity

Variable		Farm category				
		Sikela(n=20)	%	Secha(n=20)	%	Over all mean
Major waste	Dung and urine	6	30	15	75	52.5
	Dung, urine left feed and water	12	60	2	10	35
	Water, dung and feed	2	10	3	15	12.5
Mechanism of collecting waste	Municipality	0	0	0	0	0
	private	20	100	20	100	100

Table.7 Effect of waste on environment and dairy farm surrounding community in Arba Minch city

variable		Farm category				
		Sikela (n=20)	%	Secha (n=20)	%	Over all mean
Use of manure and wastes	Fertilizer and fuel	18	90	15	75	82.5
	Source of fuel only	2	10	5	25	17.5
	Others	0	0			0
Effect of waste on environment, animal and etc.	Yes	20	100	18	90	95
	No	0	0	2	10	5
Source of conflict	Leaking of waste and bad smell	15	75	18	90	82.5
	Bad smell	3	15	1	5	10
	Leaking	2	10	1	5	7.5
	Others	0	0	0	0	0

Effect of wastes management and utilization

Most respondent (95%) said that wastes affect animal, human, environment. It sometimes cause of complain with neighbors due to leaking of wastes and bad smell from the farm (82.5) and source some zoonotic disease, cough and etc. This major important problem of secha(90%)farm size when compare with sikela(75%) farm size. Regarding to use of wastes respondent uses wastes as natural fertilizer on their cultivated land and their backyard vegetable or fruit. But they do not sell the dung of animals to surrounding rural farmers. This is the same with the report from (Ajebu *et al.,* 2013) that no market of animal dung or fertilizer. At hawasa city. Other respondent uses wastes especially dung as sources of fuel (kubot). Manure can be used as sources of energy through biogas. But technology not yet used in the study area.

Conclusion and recommendation are as follows:

Dairy was found as a good source of income, food and etc. For both sikela and secha farm of producers area. Family labor was major source of dairy activity in the study area. All dairy producers hold local breed (100%) because they need or consume less amounts of feed and ability to resist diseases than other dairy cattle. The producers has the scarcity of pasture land, so they use hay and left food for their cattle. Major water source in the study area were river, pond, ground and pipe line. From this water river was the most (45%) water source, those the producers were use alternatively. In the study area major (67.5%) producers have loose house for their animal and clean it once (50%) per a day but they do not use water for cleaning of their dairy house. The major (52.5%) wastes were dung and urine. Animals dung was primarily used for fertilizer and sources of fuel in the study area. Manure can be used as sources of energy through biogas but technology not yet used in the study area. Wastes sometimes cause of complain with neighbors due to leaking of wastes disposal system and bad smell developed from the farm wastes.

Recommendation

From the finding of this study the following recommendations are suggested. These are;

In order to increase the milk production currently all dairy producers should have to construct loose type house (shelter) for their dairy animals, for the future it must be changed by stanchion house.

Training should be given on how to construct house with better design of concrete floor, drainto keep dairy cattle milk production performance and to remove liquid waste from the farmeasily.

There was scarcity of land for waste disposal far from living area, so government should be give

attention to reduce the problem of waste licking and smell for the residents.

Compost preparation training providing is also crucial for dairy producers in Arba Minch city.

Creating awareness training on how to use manure as source of power through biogas system is very necessary in the aspect of waste management and protecting the environmental pollution by methane gas.

Conflicts of Interests

The author declares no potential conflict of interest.

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