



**STUDY ON THE FEEDING, NUTRITION AND MANAGEMENT
STATUS OF TWO SELECTED DAIRY FARMS IN BAHIR DAR CITY,
AMHARA REGIONAL STATE, ETHIOPIA**

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Article Received on 10/06/2015

Article Revised on 01/07/2015

Article Accepted on 23/07/2015

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ABSTRACT

A study was conducted from October 2009 to March 2010 in Bahir Dar city to identify the major problems of livestock production and husbandry practices, to assess the feeding and breeding practices, to follow the health management and record keeping systems in dairy farms and to assess some of the determinant factors involved in the study area. Natural pasture, harvested hay, grass feed and supplements (concentrates) were the major sources of feed for dairy animals. Pure fogera breed (in Andassa) and cross-breeds of Fogera with Holstein (in both farms) are the available breeds found. Artificial Insemination (AI)

service was used as the mating system. Animals were feed and reared according to their age groups, sex, physiological status and production systems, separately. Mastitis, repeat breeding, Infectious, Non-infectious, parasitic diseases and injury were found the major herd problems in both dairy farms. However, regular deworming, treatment and vaccination practices were performed to minimize these problems. Continuous heard health management systems and record keepings; using the corresponding identification number of the animals, were also the major tasks practiced in dairy farms. Due to its enormous importance; for humans and the ecology, emphasis should be given for the improvement of livestock production and husbandry practice.

KEYWORDS: Livestock production, Husbandry practice, Feeding, Breeding, Record keeping, Dairy farms, Bahir Dar.

INTRODUCTION

Ethiopia has 35 million cattle, 24 million sheep, and 18 million goats (LMA, 2002). But this large number of animal population is not properly used due to lack of adequate knowledge and attention about animal production and productivity. Most of the Ethiopian population depends on subsistence agriculture (crop and livestock production) for their livelihood. Thus, agriculture does the foundation of the country economy and the major contributing sector to food security. However, the increasing human population coupled with increasing demand for food security is a serious challenge for developing countries like Ethiopia where productivity (meat and milk) of the livestock sector is poor despite the large number. One of the most important reasons for the poor production level is low genetic potential of the indigenous stock. In addition, the performance of animals depends on other factors such as nutrition, management, health, production system and environment (MOA, 1984).

The most suitable cow for dairy production in tropical area is a cross breed animal with a proportion of genes from high producing cattle of temperate origin and a proportion from adapted, but low producing indigenous cattle, in many cases F1, with the advantages of heterosis (Mason, 1974).

Keeping of animals of highly productive breeds in general is more economic and allows a quicker increase of food supply for a growing human population and may offer a highly prestige value to its owners, less productive breeds tend to be neglected, changed by cross breeding or replaced (Maijala *et al.*, 1984; Simon, 1984; Engelhardt, 1996).

In Ethiopia crossbreed cattle mainly crosses of Zebu and Holstein Friesian cattle have been used for milk production (Negussie *et al.*, 1998; Shiferaw *et al.*, 2003). Therefore, the study was conducted in two farms of Bahir Dar town, namely Jerusalem dairy farm and Andassa Livestock Research Center (ALRC).

Jerusalem dairy farm is owned by Jerusalem Children and Community Development Organization (JCCDO), which is found at Bahir Dar town. JCCDO was established in 1985 as an indigenous Non- Governmental organization to respond to the plight of orphaned and unaccompanied children due to natural disaster and protracted civil war that occurred in Ethiopia.

Jerusalem dairy farm is an intensive type of farm which located in west- Gojjam zone, 1 km far away from Bahir Dar town to the north direction. Bahir Dar is located 565 kms North West of Addis Ababa. It is situated at an altitude ranging from 1700-2300 m.a.s.l. The area receives an average annual rainfall ranging from about 1200-1600mm. The minimum and maximum daily temperature of the area is 10°C and 32°C respectively. The landscape of the area is marked by the presence of Lake Tanna. The agro-climatic condition of the area is predominantly Woinadega. The climate of the area includes summer (December to May) and winter (June to September). Numerous bushes and highland vegetations including agricultural products such as maize, teff, sorghum, and wheat and pulse crops cover the land.

Andassa Livestock Research Center (ALRC) is located in west- Gojjam zone, about 17 km south of Bahir Dar town. It is 585 km away from Addis Ababa in North- west direction. The average annual rainfall is 1434 mm and the average temperature range is 20.9°C to 31.1°C.

Andassa Livestock Research Center was established in 1964 on 360-hectar land as the imperial Fogera cattle conservation center with 57 Fogera cows and 3 bulls purchased locally. It was re-established as the farm in 1980/81 and started its operation with main objectives of conserving Fogera cattle and producing F1 Holsteins x Fogera crosses for distribution to farmers to increase milk production. It was upgraded into livestock research center in 2000. However, it has never brought any visible and sustainable change on the farmers life due to ineffective designed and formulated breeding program. Hence, maintaining, conserving and improving Fogera breed is a crucial issue at ARARI at this time. Therefore, the objectives of this study was; to identify the major problems of livestock production and husbandry practices including feeding and breeding practices, health management and record keeping systems.

RESULTS AND DISCUSSIONS

Feeds and Nutrition

The aim of better feeding management is to enable each animal with a ration that will encourage maximum economical production. So it is important to provide each animal with a ration that is palatable and meets the animal's nutritional requirement within the economic level. The ration also able to favor the production of milk of normal composition by conducting the health of the animal.

Major Feed Resources

The feeds and nutrition in Andassa livestock research center are based on: (1) natural pasture for both dry and wet-season (2) Supplements (concentrates) such as Fagulo and Bokolo (maize).

The major source of feed to animals is mainly natural vegetation (pasture) which is provided in two forms on open grazing land and hay. Concentrated feed is supplemented to only sick animals, matting bulls and milking cows. In addition, Elephant grass, Rhodes grass (*panicum coloratum*), Dismodium, Alfalfa, Vech, Oat, Sesbania and Stylo are sources of feed to animals in the research center.

Major animal feed resources in Jerusalem Dairy farm includes: (1) Grass hay- is a hay that is harvested at partial dryness and stored with precaution to prevent mould. (1) Grass feed such as Elephant grass, Alfalfa, Sesbania, Senas, Luseana, Guaya (meno), (3) Concentrates- are feed with high energy content that are not available in the forage. Concentrate feeds such as wheat bran; furshika and Fagulo (Nug) are available in the farm. (4) Maize by- products.

Ration Formulation

Feeds are formulated to dairy animals based on their age and production level. Daily feed ration to Jerusalem dairy animals is listed from the following table.

Table-1: Ration formulation to dairy animals in Jerusalem dairy farm.

No	Feed type	Age Group		
		Cows	Heifers	Calves
1	Wheat bran	2-4 kg	1.2 kg	0.4 kg
2	Oilseed Cake	1.3 kg	0.2 kg	0.3 kg
3	Salt	--	--	--
4	Hay	10 kg	6 kg	2 kg
	Total Concentrate feed	4 kg	2 kg	0.7 kg
	Total roughage	10 kg	6 kg	2 kg
	Total	14 kg	8 kg	2.2 kg

No ration formulation is done in the research center. Nevertheless, 70% of Bokolo (maize) with 30% fagulo or 70% of fagulo with 30% of Bokolo (maize) is supplemented after mixed with 2% salts.

Forage Development and Feed Production Strategies

Forage – Forages are vegetable feeds or pasture and green feed that contain a relatively low percentage of energy and high percentage of fiber (in contrast to concentrates). Both dairy farms have their own well-demarcated land for forage development. Elephant grass and Sesbania are the major forages developed in the compounds of both farms.

Watering Management

Water is required for regulation of body temperature, digestion, metabolism, excretion, hydrolysis, transportation of nutrient and waste in the body (Mc Donald *et al.*, 1988).

Dairy animals need much water for milk production. Clean fresh water should be available at all times. Because inadequate water supply depress feed intake and milk production. In fact, in Jerusalem dairy farm clean fresh water is available at all times. Dairy animals were watered on watering trough, which is constructed out of their house (barn). The water trough is long enough to carry animals once at a time. The animals can drink on both sides of the trough with out any difficulty. The trough is cleaned daily before the dairy animals begin drinking. In contrast, there is no provision of clean water supply in the research center. Instead, animals watered in Andassa River which is dirty water. Due to this poor water supply, animals are frequently infested with GIT parasites.

Breeding and Genetics

For farm animal species, the term ‘genetic resource’ is usually understood as synonymous with the term ‘breeds’. Breeds have been formulated by the activities of humans and by natural selection. Due to the source of animal breeding, highly productive breeds in most farm animal species have been developed and available throughout the world. This is particularly the case for breeds of cattle, whose genetic material can easily be moved in the form of semen and embryo (Fries and Ruvinsky, 1999).

Herd Profile (Structure)

Crossbreeds of Fogera with Holstein are the available breeds found in Jerusalem dairy farm. Similarly, pure Fogera and crossbreeds of Fogera with Holstein are the existing breeds found in the research center. The genotypes, species and herd profile (structure) in Andasa livestock research center (former ranch) and Jerusalem dairy farms is shown below on table-2 and 3, respectively.

Table-2: Cattle Inventory (herd structure) in Andassa dairy farm

Breed	Age (month)	0 ≤ x ≤ 8	8 ≤ x ≤ 19	19 ≤ x ≤ 32	x ≥ 32	Total
Fogera	Female	46	59	49	170	324
	Male	37	21	10	22	90
≥F1	Female	12	3	10	17	42
	Male	9	-	-	1	10
Borena	Male	-	-	8	-	8
	Total	104	83	77	210	471

Table-3: Dairy cows Information in Jerusalem dairy farm.

Animals		Number
Milking		5
Pregnant and Milking		4
Pregnant and dry		2
Pregnant and heifers		4
Calves	Male	3
	Female	6
Heifer		1
Total		25

Methods of Selection

In Jerusalem dairy farm animals with high milk yield, docile in behavior, short calving interval (CI), and disease resistant animals are selected for dairy purpose while animals with problems of chronic disease and poor productive performance are culled from the farm. Male calves are sold after 6 months of age whereas female calves reared in the farm for replacement stock. The Andasa livestock research center selects Fogera bulls and heifers at the field before joining the center by their phenotypic characteristics, Ancestors history, economic traits and physical appearance. The Fogera breed has many genetic characteristics among which include substantial tolerance or resistance against heat stress and solar radiation may be because of its white color and short hair length. The breed is known for its tolerance to high altitudes, parasitic disease infestation, wet soils or swampy areas, chronic lack of water, seasonal scarcity, low quality of feed and other unfavorable environmental conditions (Albero and Haile-Mariam, 1982). Animals with medium head size, pointed up horns, long dewlap, large body size, long tail and wide hoof, long prepuccial sheath (in males), long naval flap (in females) are selected and introduced to the center.

Breeding and Matting Systems

Breeding and matting systems are cross-breeding and AI, respectively in Jerusalem dairy farm. Both pure-breeding and cross-breeding systems are performed in the research center. For pure breeding, matting is held using bull (pure fogera) where as for crossbreed cows AI is used. Trained professionals do AI. Semen is directly deposited in the uterus after checking that the cow (heifer) is at heat.

In natural matting system (pure breeds) one bull can serve 25-50 cows. The bull is replaced with another bull while he becomes weak. To reduce the level of inbreeding within the herd, bull is properly selected from history of its Ancestors that are far in blood level from the breeding cows.

Culling

Animals with poor performance in breeding (infertility), low productivity and poor body confirmation, chronic diseases like mastitis and brucellosis and old aged animals are culled from both dairy farms. Depending on the capacity of the research center, male calves are sold after 6 months of age while female calves reared in the center for replacement stock. In the same way, male calves sold while their age and body conditions reach for selling in Jerusalem dairy farm.

Herd Health Management

The Jerusalem dairy farm management focuses on prevention of diseases which are effective and more profitable than treatment strategies by: application of zero grazing system, prevention (avoid) introduction of new animals to the farm, strategic deworming, maintaining high level of resistance to calves to enzootic diseases of the area by feeding adequate colostrums during birth and vaccination after 6 months of age.

The Andassa livestock research center performs deworming, vaccination and treatment of causes (disease conditions) to improve the health status of the herd. Nevertheless, Infectious, Non-infectious and parasitic diseases are common in this center (Andassa).

Infectious Diseases

LSD (Lumpy Skin Disease), FMD (Foot and Mouth Disease), Dermatophilosis, Pneumonia, Calf diarrhea, Anthrax and Heart water are the most common infectious diseases affecting the health of dairy animals in the Research center.

Non-Infectious Diseases

These includes deficiency diseases and skin diseases (Mange, tick, lice infestations)

Parasitic Diseases

Parasitic diseases such as Schistosomiasis, Paramphistomum, Liver fluke (fasciolosis), gastro intestinal (GIT) parasites, and others like abscessation and injury due to rough housing (in calves) are the major health problems facing in the center.

Vaccination

I heard (informed) that vaccination was given to dairy animals (cows) against five types of diseases (Black leg, pasteurelosis, every 6 months, for Anthrax, FMD and LSD yearly, in Jerusalem dairy farm, but no vaccination has been given till I finished my externship period. Like that of Jerusalem dairy farm, the Andassa livestock research center is vaccinating animals against the above 5 types of diseases. All animals in the research center are vaccinated starting from 6 months of age on words.

Calf Health Management

In Jerusalem and Andassa dairy farm calf mortality is low due to feeding of colostrums in adequate amount during birth and vaccination of calves after 6 month of age. In addition, the Andassa livestock research center practice deworming after the age of one month by using broad-spectrum anthelmintics (Albendazole). These help calf mortality to be low.

Reproductive Health Management

Heat Detection

The Jerusalem dairy farm utilizes visual means of detecting heat in which the heat symptoms are noticed mostly while the cows are exercising (relaxing). Heat detection is also be conducted during milking time, feeding, washing and up on general inspection while the cows were in their stall. In addition, every day all cows are observed for heat detection. In the Research center, for pure Fogera breeding, heat detection is performed by the bull itself whereas for cross-breeds heat detection is attended by record and behavioral changes. In this center heat detection is practiced at barn and field during grazing.

During heat period the following signs are common in cows of both dairy farms and awared by farm personals (attendants). Red and swollen vulva, the cow (heifers) blow, vaginal

discharges, lowers of the back, decreased appetite and milk production, active, restlessness, mount on others and stand while mounted.

Abortion

Abortion is not a problem in both Jerusalem dairy farm and the research center.

Repeat breeding

Repeat breeding is one of the commonest problems in both dairy farms that results extension of calving interval. In the research center it might be occurred as a result of incorrect heat detection since the heard size is large. However, the reason is not identified in Jerusalem dairy farm. In addition, infertility becomes a problem in male animals than females in the research center.

Mastitis

Mastitis is the major problem in Jerusalem dairy farm, however, is not a problem in Andassa research center.

Table-4: Confirmation Mastitis test for dairy cows in Jerusalem dairy farm, 2001 E.C.

Name of animal	Sample type	FR	FL	RR	RL
Shashe	Milk	-	-	-	-
Tizita	Milk	-	-	-	-
Beletech	Milk	-	-	-	-
Amelmal	Milk	+	++	+++	++
Medhin	Milk	-	-	-	+
Mesere	Milk	++	++	-	-
Densa	Milk	+	+++	++	++
Hibste	Milk	-	++	+++	++
Yetnebrshe	Milk	-	-	-	-
Atrishiw	Milk	-	++	-	-

Teat quarters position: FR- form right, RR - right rear, FL- front left, RL- right left

+: Trace inflammation

++: Moderate inflammation

+++: Sever inflammation

Housing Systems

Housing for Dairy Cows

The housing system for dairy cows in both farms is closed type which has concrete floor with adequate drainage, ample space for each animals and good ventilation. The house was constructed with iron roof and half cemented wall with wire mesh stretched between the roof and wall for ventilation in Jerusalem dairy farm. In Jerusalem dairy farm animals managed at

their barn in head-to-head system whereas in Andassa livestock research center, dairy cows move freely (no head-to-head as well as tail-to-tail system). The Andassa livestock research center dairy farm section is generally has five barns for different groups. The group is made based on strategies like age, sex, breed, and production level. These include: Heifer rearing unit, bull rearing unit, calf rearing unit, delivery unit and quarantine (for sick and diseased animals) unit.

Housing for Calves

The Jerusalem dairy farm has no separate house to calves. Calves are reared within dairy cows house. Calves are separated from their dam with slight fence between calves and dam. However, the house of calves in Andassa research center is constructed with concrete floor and wall, and adequate light but no enough space for each calf. In general, the house is constructed with corrugated iron in one side and the other side is simply fenced with wood that helps air to enter easily.

Milking Parlour and Type of Milking

Milking is done manually by hand in both dairy farms. The milking process starts first by tying the tail of the cow with its hind leg to prevent tail movement in interrupting the milking process and also prevent milk contamination. After the stall bedding is cleaned for faces (dung), towel is soaked in luke warm water, and the udder and teats are washed thoroughly. The milker then let some streams of milk to drop from each teat on the ground and checked for any abnormal coloration and if no continue milking. The collected milk from each cow is taken to the weighing and recording room. Milk from each cow is weighed and the weight is recorded on a daily milk recording (especially in Jerusalem dairy farm).

In both dairy farms there is no separate milking parlour. Cows milked in their barn (house). Restricted /partial suckling is performed in Andassa livestock research center dairy farm. Calves suckle only two teats and the other two teats were milked. In contrast to the research center, calves do not suckle in Jerusalem daily farm. As soon as a calf is borne given colostrums after milking and later on additional feed were supplied with milk.

Other Infrastructures

The dairy farms were well fenced to prevent entrance and exit of animals and others to the farm. The Andassa dairy farm has no ditches but there are crutches, weight balance and farm equipment's including Burdizo castrator, AI (full freezers with insemination gun), and Ear

tag (ear applicator) to identify each animal. In contrast, the Jerusalem dairy farm has only ear applicator (ear tag).

Farm Record Management

Feed and Nutrition Records

Recording is a vital part of every cattle management program. Cattle management becomes more difficult if any information have not taken and recorded. Records can be many style, the important point is that the appropriate information be recorded in a form that can be used to assist in making management decision and expected to increase animal profits (Russell, 1999).

In Jerusalem dairy farm the type and amount of feed consumed (hay, green feeds, concentrates) were recorded. In Andassa LRC concentrate feeds (Fagulo & Furshika) that are supplemented for sick animals, milked cows and mating bulls were recorded. A 4 kg supplement feed was given for crossbreeds per day but no record for Fogera breeds (given roughly). Similarly, from a mixed supplement (50 kg Furshika with 10 kg Fagulo and 2% salt) 6 kg /day was given for milking cows in Jerusalem dairy farm. Dry cows and heifers supplied 1 kg concentrates in addition to hay. Currently there are 3 calves in Jerusalem dairy farm and supplied 2 kg mixed feed (Furshika and Fagulo) together daily.

Breeding Records

In Andassa LRC every animal has its own record based on identity of parents, source of parents, exotic blood level and herd structured. Animals are identified by their ear tag number. Artificial insemination date, weaning date and calving date are recorded. The source of parents is mainly from Fogera and Holstein semen from abroad (see herd structures).

In Jerusalem dairy farm source of parents and their exotic blood level is recorded. The sources of parents were mainly from fogera (From Andassa) and Holstein semen from abroad. The blood level of animals is 50%, 75 and 95%. AI date, weaning date and calving date are also recorded.

Production Records

Weight

In Jerusalem dairy farm the growth performance of animals is evaluated by heart girth measure. The maximum-recorded weight of heifers and adult cow is 200 kg and 450 kg

respectively. Similarly, animals in the research center are evaluated based on their production performance (i.e. milk and weight gain). Weight of calves, weight at weaning, weight at yearling and weight at adult is always measured by weighing balance and recorded (see table-5). The calving weight of heifers ranges from 200-250 kg.

Table-5: The Growth performance of Fogera cattle

Traits Studied	Mean	Study site	Source
Birth weight (kg)	21.9	Andassa LRC	Giday, 2001
Weaning weight (kg)	100.9	“	“
Yearling weight (kg)	145.24	“	“

Milk Yield

The maximum milk yield per cow per day is 18 liters in Andassa research center. Similarly, the amount of milk yield per cow per day in Jerusalem dairy farm is recorded (See table-6 and 7 bellow).

Table-6: Estimates of productive performance of Fogera cattle

Traits studied	Mean	Study site	Source
Mean lactation yield (liters)	780	Andassa L.R.C	-
Mean partial lactation milk yield (lts)	288.5	Andassa L.R.C.	Unpublished
Mean partial daily milk yield (lts)	0.99	Andassa L.R.C	Unpublished
Mean lactation length (days)	290.6	Andassa L.R.C	Unpublished

Table-7: Daily milk yield recording format of Jerusalem dairy farm

Date	e.g. 01-01-200 E.C.		02-01-2002 E.C.	
	Morning	Afternoon	Morning	Afternoon
Average record				
Densa	5	2-3		
Beletech	5	3		
Shashe	8-9	5		
Medihn	4.5	2.5		
Ytenebersh	4	2.5		
Bulal	5	3		
Meseret	8.5	4		
Yimesgen	5	3		
Aregashe	6	3		
Total				
For cheese making				
For sales				
For caves				
General Total				

Health Records

Age at first calving (AFC) and calving interval (CI) of each animal is recorded in both dairy farms. AFC is on average 3 years and CI is almost yearly in Jerusalem dairy farm.

The table below shows the reproductive performance of dairy animals in Andassa research center.

Table-8: estimates of on- station reproductive performance of fogera cattle.

Traits Study	Mean	Study site	Source
Age at first service (mths)	44.8	Andasa LRC	Giday, 2001
Age at first calving (mth)	54.60	“	“
Gestation length (days)	281.3	“	“
Calving interval –CI (days)	560.6	“	“
Days open (days)	280.5	“	“

In these dairy farms, health problems that occurred and their control measures are also recorded.

Financial Records

The objective of Andassa livestock research center is conservation and improvement of Fogera breeds, but not commercial oriented. As a result, cost benefit analysis is not evaluated. However, sales of products (milk for workers), live animals during culling, and Fig (manure) are the income source of the center.

Likewise, no financial records are found in Jerusalem dairy farm. But the farm earns an income from sales of animal products and by –products (table-9).

Table-9: The income sources of Jerusalem dairy farm.

No.	Name of Product or by-product	Saling cost (per Kg or liters)
1	Cheese Hard cheese	60 Birr
	Cheese	09 Birr
2	Butter	60 Birr
3	Milk	5.5 Birr
4	Manure	Used for vegetation

CONCLUSIONS

Jerusalem dairy farm is established by JCCDO with the aim of supporting orphaned and disadvantaged children where as the Andasa livestock research center is established for conservation and improvement of Fogera breeds. Pure fogera breed (in Andassa) and crossbreeds of Fogera with Holstein (in both farms) are the available breeds found.

The major sources of feed to animals in the research center are natural pasture (forage) in the form of hay and free grazing land. Concentrate feeds are supplemented for only mating bulls, lactating cows and sick animals. Grass hay, green feed, concentrates and maize by-products are the sources of feed in the case of Jerusalem dairy farm. Repeat breeding is the common problem in both farms that results extension of calving interval. In both farms calve mortality is low due to feeding of adequate colostrum and vaccination. Fogera heifers and bulls are selected based on their phenotypic characteristics and Ancestors history from record in the center.

The major health problems that occurring in the research center includes LSD, FMD, Liver fluke, Schistosomiasis, GIT parasites and injury (in calves). The health management of Jerusalem dairy farm focuses mainly on prevention of diseases than treatment strategies. Heat detection is awared by observing behavioral and physiological changes of the cow. There is

no evaluation of farm economics in both farms. Therefore, the following points are recommended: Special attention in management for pregnant cows, recently calved cows and weaned calves should be given in both farms. Effective treatment, control and prevention strategies against major diseases should be done in both dairy farms. Repeat breeding should be eliminated by observing while cows at heat period and by detecting and serving heated ones at the correct time. In addition, reproductive problems should be diagnosed and treated immediately. There should be a professional in dairy farms to increase the production and productivity of dairy animals by reducing the health problems. The expended cost for the farm purpose and income gained from dairy products as well as live animal sells should be recorded so that cost-benefit analysis should be done in both farms.

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